



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
14.06.2023 Bulletin 2023/24

(51) International Patent Classification (IPC):
E04B 9/18 (2006.01) **E04B 9/22** (2006.01)
E04B 9/30 (2006.01)

(21) Application number: **21856329.4**

(86) International application number:
PCT/RU2021/050167

(22) Date of filing: **16.06.2021**

(87) International publication number:
WO 2022/035353 (17.02.2022 Gazette 2022/07)

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **Pugachev, Sergey Yurievich**
St.Petersburg 197198 (RU)

(72) Inventor: **Pugachev, Sergey Yurievich**
St.Petersburg 197198 (RU)

(74) Representative: **Jeck, Jonathan**
JECK, FLECK & Partner mbB
Klingengasse 2
P.O.Box 14 69
71665 Vaihingen/Enz (DE)

(30) Priority: **10.08.2020 RU 2020126665**

(54) **COUPLING ASSEMBLY OF A DEVICE FOR FASTENING A SUSPENDED CEILING**

(57) The invention relates to the construction industry and can be used in the field of creating suspended surfaces and coverings, in particular suspended ceilings of var-ying design, and also other analogous suspended structures. The technical result which can be achieved

with the use of the invention consists in increasing the reli-ability of a coupling assembly of a device for fastening a suspended ceiling or other analogous suspended coverings. The technical result is achieved using a coupling assembly of a device for fastening a suspended ceiling.

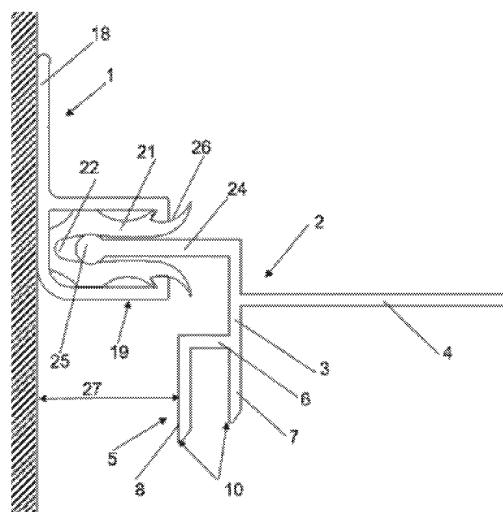


Fig. 2

Description

Purpose and scope of application

[0001] The invention relates to the construction industry. This invention can be used in the field of creating suspended planes and coverings. This invention may be used in the field of creating suspended ceilings of various designs. And the invention can also be used in the field of creating other similar suspended structures.

Prior art.

[0002] Structures that utilize suspended ceilings of various kinds are well known. These structures are widely used indoors. We are talking about suspended ceilings. Also, these structures are used in devices for a wide variety of purposes.

[0003] From the prior art, a ceiling covering attachment assembly to a wall is known. This attachment assembly includes a U-shaped profile member. A shelf of the profiled element adjoins the wall from the inside. The shelf of the profile element has a longitudinal groove. The attachment unit also includes a cage for installation within the profiled element. This embedded part in a cross section is made in the form of a triangle. One corner of the triangle is placed in the groove of the profile element. And the opposite to this corner facet is in contact with another vertical flange of the profiled element. The facet is in contact in the working position. See patent for a useful model of the Russian Federation N_o 37744, cl. IPC E04B 7/10.

[0004] Disadvantage of the known profile is its limited functionality. As the profile is designed only for fastening the cloth stretch ceiling to the wall. And this profile is not applicable in the structures of the suspended ceiling.

[0005] Also known is a profile for installing a suspended ceiling. This profile is formed by two mutually perpendicular shelves. Also, this profile is formed by a lintel that is attached to one of the shelves. This lintel is parallel to the other shelf. And this bridge is wider than the other flange (patent RU 16605 U1, cl. IPC E04B 9/18).

[0006] The disadvantage of the known profile for suspended ceilings can be attributed to the narrow functionality. Since the known profile provides a rigid attachment of ceiling panels to the ceiling frame and supporting surfaces. The rigid mounting design of the suspended ceiling panels to the supporting surfaces contributes to the increasing tensile stresses. This occurs during use. This is due to changes in the geometry of the walls and mating surfaces. And leads to warping and destruction.

[0007] As the closest technical solution of the claimed useful model, a ceiling profile is selected. This profile is used for the installation of stretch and suspended ceilings. This profile contains a first and a second shelf. In the end stepped part of the first shelf is a groove. The depth of the groove is more than half the thickness of the first shelf. The first flange is connected to the second

flange by two partitions to form a channel. The stepped part of the first shelf is provided with an additional cantilever shelf. The cantilevered shelf is located to the outside. And there is a cantilever shelf on the inner side of the second shelf (patent RU 182821 U1, IPC E04B 9/30).

[0008] The disadvantage of the closest analogue, as well as other known analogues, is its low reliability. Low reliability is associated with possible damage to the ceiling fabric. For example, the canvas, which is made of gypsum board (GBC) and its analogs. Analogues assume, as in solution RU 16605, rigid attachment of the sheet to the wall surface. Fastening the sheet with metal profiles. The walls of apartments and houses are inevitably subject to changes in geometry. This is especially true for new houses during the initial shrinkage of the building. Also on short-term changes in geometry influence temperature changes, repairs, etc. Changing the geometry of the walls when the ceiling profile is rigidly fixed is accompanied by an increase in the ceiling plane. Increase of the plane due to the different heights of the walls. This situation leads to tensile stresses. As a consequence, cracks in the gypsum plaster and plaster.

[0009] This problem also applies to other joints. Wall-wall, wall-floor, door frame-wall. As well as any other adjoining surfaces with variable geometry. In addition to changing the size of the ceiling space, the angle between the assembled ceiling and the horizontal normal changes. This results in additional stresses on the fixings. As a result of these factors, classic suspended ceiling systems require a complete replacement of the suspended ceiling system. This includes the counterparts discussed above. And/or suspended ceiling systems require replacement and/or devices to attach them to supporting surfaces. And/or suspended ceiling systems require repair.

[0010] No solutions have been identified in the prior art that provide the ability to attach ceiling coverings. Coverings that provide flexible decoupling. The decoupling of the surfaces of a ceiling covering which interlocks with adjacent walls or a supporting ceiling.

The essence of the claimed invention.

[0011] The technical problem is the creation of a simple construction of a docking unit (docking node) of a suspended ceiling attachment device. In particular, the construction of a suspended ceiling. This construction is devoid of the disadvantages of known analogues. The solution to the problem is provided by the claimed invention.

[0012] The technical result, which is obtained by using the claimed invention, is to improve the reliability of the assembly. A junction node of a suspended ceiling attachment device. Or other similar suspended ceilings. The technical result also consists in increased reliability by cushioning the above-mentioned adverse effects on the attachment assembly and the suspended ceiling structure. Or other similar suspended coverings. And, as a consequence, the resistance of these suspended ceilings to loads is increased. Stresses occur in the process of operation.

[0013] The technical result is achieved by using a junction device fastening device suspended ceilings. This node includes interlocking joints and a supporting part. Couplings are interconnected by reciprocating elements. The support portion is provided with a mounting means with a support surface. The support portion includes a mounting portion. The mounting portion is provided with a means of mating with the surface of the suspended ceiling panels. The locking connection is cushioned. The locking connection consists of two mating parts. These parts are provided with mating elements. The mating mating elements are on the mating counter and mounting parts. One of the mating parts is equipped with a C-shaped profile with an open cavity. A damper is installed in the cavity. This damper is provided with a locking element for the mating part of the locking joint. The connection is placed on the second part of the interlocking assembly.

[0014] According to the claimed solution, the C-shaped profile may be made with an outer contour close to a parallelepiped. And the C-shaped profile may be made with an area of the entrance opening of the cavity smaller than the area of the side of its placement.

[0015] According to the claimed solution, the damper may be provided with a locking element. This element is made in the form of a longitudinal groove. The element is axisymmetric to the inlet opening of the C-shaped cavity of the profile. The slot is open on the side of the entrance hole of the cavity. And the reciprocal element of the locking connection of the second part of the junction is made in the form of a longitudinal flange. The width and length of the groove are selected from the condition of the possibility to cover the mating element of the lock connection. The width and length of the groove is selected from its retention in the cavity of the groove. The width and length of the groove is selected with the possibility of displacement of the flange in the groove cavity. The displacement of the shelf to compensate for external influences on the design of the coupling assembly.

[0016] According to the claimed solution, the damper may be made of an elastic material. The damper may be provided with an external relief surface. This surface forms protrusions and depressions throughout the surface. The damper may be made with the possibility to form closed cavities along the inner surface of the C-shaped cavity. The cavities between the protrusions of the damper's relief surface mating with it. The damper in the alignment of the groove can be made with a protrusion beyond the outer contour of the C-shaped profile hole. And the damper can be provided with internal and external bevels. The bevels are necessary for entering the fixation element into the cavity of the groove of the damper. In another embodiment of the claimed solution, the damper may be additionally provided with bends protruding beyond the outer contour of the C-shaped profile. The bends along the flange of the damper groove. As well as the bends around the contour of the inlet opening of the C-shaped profile cavity.

[0017] According to the claimed solution, the longitudinal flange of the second part of the locking connection may be additionally provided with a protrusion at the free end. In any embodiment of the claimed solution, the mounting portion may be provided with an outer horizontal mounting flange. A shelf for mounting a suspended ceiling. The mounting portion may be provided with a vertical mounting member. The mounting element is required for fixing the outer covering of the suspended ceiling panels. The panels are mated with a vertical panel. This panel is oriented downwards. The vertical panel is located below the mounting panel. The vertical panel is located along the side of the mounting panel. The side is facing the mounting surface.

[0018] An embodiment of the claimed solution is possible. According to this solution, the mounting portion may be provided with a C-shaped profile. The profile is provided with a damper with a longitudinal flange retaining element. The longitudinal flange of the locking element mate. The shelf is made on the support portion. In another embodiment, the support portion may be provided with a C-shaped profile. The profile is provided with a damping element for securing the longitudinal flange. The longitudinal flange of the locking member. The flange is made on the mounting part. The supporting part in the upper part may be provided with a supporting, vertical shelf. The vertical shelf is mated to the back wall of the C-shaped profile. In another possible embodiment, the support portion may be in the form of a C-shaped profile. But this profile is integrated into the supporting surface.

[0019] In another embodiment, the vertical mounting member of the mounting portion may be located below the level of the mounting flange. The mounting portion element may be positioned to secure the suspended ceiling panels. The vertical mounting member of the mounting portion may be in the form of a U-shaped cross-sectional profile. This profile contains a transverse shelf. The shelf is mated with vertical ribs. One of the ribs represents part of the vertical panel. The panel forms its outer rib. The second, opposing rib is set back from the first. The rib is offset by the width of the transversal flange. And is an inner rib.

[0020] In yet another embodiment of the claimed solution, the vertical mounting member of the mounting portion may be in the form of a U-shaped profile. This profile is positioned obliquely to the vertical panel. The profile is located below the level of the mounting shelf for mounting the suspended ceiling panels. A transversal flange is made at the lower free end of the vertical panel with projections on either side. The vertical leading and trailing edges are slightly divergent. The divergence increases towards the bottom.

[0021] In another embodiment of the claimed invention, the mounting element can be made in the form of a stepped protrusion. This protrusion is formed at the free end of the vertical panel. The protrusion is formed at the bottom of the vertical panel. The protrusion is formed in the form of an outwardly oriented short shelf. The shelf

is provided on its outer end with a vertically downwardly oriented rib. The rib is provided with a support ledge. It is a protrusion on the side facing the supporting surface.

[0022] According to any of the above-mentioned embodiments of the claimed solution, the length of the flange of the locking response member may be made to allow the formation of a shadow groove. And the length of the groove of the damper may be designed to allow for the formation of a shadow groove. The shadow groove between the rib of the mounting member of the mounting portion and the support surface may be designed to form a shadow groove. The rib of the mounting member faces the supporting surface. And the lower surface of the horizontal flange may be provided with a raised, toothed surface. Also, and/or the inner surface and/or the outer surface of the mounting member may be provided with an embossed, toothed surface. The variants disclosed above can be used separately and independently or together.

[0023] No analogues close to the claimed solution have been identified in the prior art. Analogues both in terms of its design solution and the technical result achieved.

Brief description of the drawings

[0024] The claimed technical solution is illustrated by drawings, where

Fig. 1 is a variant of realization of the coupling node. Implementation according to the claimed solution with a mounting part. This mounting part is provided with a C-shaped profile;

Fig. 2 - embodiment of the coupling unit. Implementation according to the claimed solution with a support part. This supporting part is provided with a C-shaped profile;

Fig. 3 - embodiment of the coupling unit. Implementation according to the claimed solution with a support part integrated into the support surface. This support part is provided with a C-shaped profile;

FIG. 4 - a variant of practical application of the claimed solution as part of spatial structures. Where:

- (a) a variant of application of the claimed solution in structures. These structures are coupled with a supply and exhaust ventilation system;
- (b) a variant of applying the claimed solution in the structures of cornice systems.

[0025] It should be noted that the attached drawings illustrate several specific embodiments of the invention. And these drawings cannot be considered as limiting the scope of patent protection.

Feasibility of the Invention

[0026] In the examples of embodiments of the claimed

solution shown in the drawings of FIGS. 1-4, the suspended ceiling mount junction assembly is a structure. This structure consists of a support part 1 and an installation part 2. These parts are interconnected by a locking connection. The interlocking connection consists of mating elements for each of the mating parts of the junction. The mating parts form a cushioned joint together. The mounting and supporting parts are of a profiled construction. These structures are made of metal, composite or polymeric materials. The materials are known in the prior art. The materials are applicable for this kind of structures.

[0027] In this case, the mounting part 2 is provided with a mating vertical panel 3. The mounting part 2 is provided with a horizontal mounting shelf 4. The shelf 4 is located on the outer side of the mounting part 2. The shelf 4 is intended for mounting and fixing the suspension flow panels. For example, the panels that are made

- Of plasterboard (gypsum plasterboard);
- Fibreboards (wood-fibreboard) panels;
- WBC (chipboard);
- plywood

[0028] Shelf 4 is made below the level of the upper and above the lower free end of the vertical panel 3. Shelf 4 is made with the formation of a right angle at the junction of the vertical panel 3 and the mounting shelf 4. This allows accurate positioning of the suspended ceiling sheet panels. Positioning of the mounting part of the junction on the profile structure. And also gives the construction additional rigidity. Below the mounting flange 4 there is a vertical panel 3. The vertical panel 3 is provided with a vertically oriented mounting element 5. The element 5 is used for fixing the external protective covering of the ceiling panels. For example, a layer of plaster or other similar protective or decorative coating. For this purpose, the mounting element 5 can be made, for example, in the form of a U-shaped cross-sectional profile (FIG. 2). This profile contains a transverse, horizontally oriented shelf 6. The shelf 6 is mated with two vertical ribs. One of the ribs represents part of the vertical panel 3. The vertical panel 3 forms its outer rib 7. And the second, opposing rib is offset from the first one by the width of the transverse shelf 6. And this opposing rib is the inner rib 8. The horizontal flange 6 with its inner and outer sides forms the cavity 9 of the groove. The inner and outer sides are formed by ribs 7 and 8. The cavity 9 of the groove is open to the bottom. The inner rib is elongated in relation to the outer rib. The free ends of the ribs are made with bevels 10 of the end surface of each rib. The free ends of the ribs are made with the side facing outward. This configuration of the mounting element 5 allows a secure attachment of the outer protective or decorative layer (outer layer). For example, plaster 11. The plaster 11 is applied to the mounted panels 12 of the suspended ceiling. The panels are attached to the mounting shelf 4 from below (Fig. 4).

[0029] According to the claimed solution, the mounting element 5 of the mounting portion can be made inclined (Fig. 1) with respect to the vertical panel 3. A transverse shelf 6 is made at the lower free end of the vertical panel 3. The transverse shelf 6 is made in a transverse direction to it. The transverse shelf 6 is made with the formation of an acute angle between the upper surface of the shelf 6 and the inner surface of the adjacent vertical panel 3. The transverse shelf 6 is formed by forming an obtuse angle between the upper surface of the shelf 6 and the outer surface of the vertical panel 3. The transversal shelf 6 has protrusions on both sides of the vertical panel 3. The ribs 7 and 8 are made with a slight divergence, which increases downwards. The ribs 7 and 8 are provided with top flattened support projections 13. The ribs are provided with protrusions along the lower free end of the outer rib 7 and oppositely located end on the inner rib 8. Supporting protrusions are counter oriented in the groove cavity 9. The inner surface of the groove cavity is worked with a relief, toothed surface 14. As well as the outer surface of the outer rib 7 and the lower surface of the mounting flange 4 for installation of the suspended ceiling panels. The presence of oppositely oriented supporting protrusions 13 in the alignment of the groove 9 allows the use of the mounting element for fixing the plaster. And allows the use of the mounting element for fixing similar coatings. In this case, an even outer layer is formed in the alignment of the mounting element. In the alignment, where the protrusions 13, on the one hand, allow to align the outer layer. And on the other hand, the protrusions 13 serve as a strengthening element of the connection of the body of the mounting element. The hardening with the plaster inserted in the groove. Or hardening with another similar coating introduced. The adhesion of the housing elements of the mounting element groove, with the plaster layer introduced, is strengthened by the toothed surface 14. The adhesion is strengthened by working through the inner surfaces of the groove. As it is presented in the example of the implementation of the claimed invention in the drawing of Fig. 1.

[0030] The outer grooving of the surfaces of the rib 7 of the mounting element and the mounting flange 4 allows for strengthening the grip of the suspended ceiling panels. The adhesion of the panels with the above-mentioned coatings. Bonding in longitudinal and transverse direction. This helps to maintain the integrity of the coating. Including under the influence of adverse loads. Loads are associated with vibrations. Loads are associated with longitudinal and shear movements of the mating structures of the suspended ceiling. Loads are related to the movement of the supporting structures during operation.

[0031] The schematic drawing of Fig. 3 shows an embodiment of the claimed solution. The mounting element 5 can also be made in the form of a stepped projection 15. This projection is formed at the free end of the vertical panel 3. The protrusion is formed in its lower part. Along the lower end of the panel 3, a short shelf 16 is formed.

The shelf is oriented outwardly. The shelf is provided at the outer end with a vertically oriented downwardly oriented rib 17 of the stepped projection 15. The rib 17 is provided with a support ledge 13. The rib 17 is provided with the side facing the support surface. And, the outer and inner surfaces of the rib 17 are worked with a toothed embossed surface 14. This embodiment of the mounting element is part of a U-shaped profile. By forming the mounting element 5 with an outward projection, a recess is formed. A notch is formed on the side of the supporting surface. This notch allows for additional attachment of the external coating (e.g. plaster). The embossed surface and the protrusion at the bottom of the rib perform a similar function. The function is indicated for the previously discussed embodiment. A variant embodiment of the claimed invention is shown in the drawing of FIG. 1.

[0032] The mounting of the suspended ceiling panels is in the form of a threaded mounting. The execution of the adjacent mating surfaces of the mounting portion is in the form of corrugated surfaces. This contributes to a more accurate positioning of the connections. The embossed structure forms guide channels for the movement of the threaded elements. The risks of the guide channels deviating from the specified direction are minimized. Accurate positioning of the suspended ceiling panels as part of the installation structure contributes to an even distribution of loads on the suspended ceiling structure. This enhances the effectiveness of minimizing the effects of adverse loads on the ceiling covering. These loads are caused by vibrations. The loads are caused by shear and longitudinal movements of the mating ceiling and support structure during use. This helps to ensure that the integrity of the ceiling covering is maintained. It also ensures that it can be operated safely.

[0033] At the same time, the fixation of the suspended ceiling panels to the mounting shelf 4 can also be carried out by other methods known from the prior art.

[0034] Supporting 1 part of the claimed design of the junction unit is made with the possibility of mating with the supporting surface. The support 1 part contains one mating surface. Thus, in the examples presented in the drawings of Figures 1-3, the support part is provided with a support 18 vertical shelf. This can be seen in the embodiments presented in the drawings of Figs. 1 and 2. The vertical shelf is intended to be mounted externally to the support surface. For example, by means of threaded connections. In the solution illustrated in the drawing of FIG. H, the support portion is incorporated into the support surface. The support portion provides a mating with the support surface over the entire lateral surface of the support portion of the mating assembly. Both of the above embodiments form a secure connection to the support surface. Both variants form a reliable connection with uniform distribution of loads over the structure. The variant, which is presented in the drawing of FIG. H, additionally allows the support element to be concealed. This contributes to improving the performance characteristics of the junction design. Because it reduces the number of

structural elements. These elements require masking from direct visual inspection. The elements require camouflage during direct operation of the suspended ceiling structure.

[0035] The interlocking connection between the support and installation parts of the junction is designed to be cushioned. This locking connection is made consisting of mating, reciprocal parts of the connection. Where one of the parts is a horizontally oriented C-shaped 19 profile. The C-shaped 19 profile has a laterally opening groove cavity. The C-shaped 19 profile has an inlet 20 opening of the groove cavity. The groove cavity opening is smaller in area than the area of the side of the groove opening. The C-shaped profile is box-shaped. The box shape is close to a horizontally oriented parallelepiped. And the C-shaped profile is provided with an elastic damper 21 with an axial 22 groove. This groove is coaxial to the inlet opening 20. Any elastic material may be used as a damper material. Elastic materials are known in the prior art. Elastic materials are used for similar designs and purposes. For example, the damper may be made of PVC. Functionally, the damper provides insulation to structural parts. Functionally, the damper isolates mating elements. The damper functionally isolates mating parts from each other. Thereby eliminating adverse effects on the ceiling covering structure. The risk of warping of the structural elements is reduced. The structural elements of both the junction and the suspended ceiling. And, as a consequence, leveling out the destruction of the ceiling covering. This damper solution also provides effective fixation of the mating elements of the locking joint. The damper solution absorbs unwanted vibrations, shear and longitudinal movements of the mating elements. This stabilizes the overall construction of the suspended ceiling. It maintains the structural integrity of the suspended ceiling throughout its entire service life. The outer surface of the damper is shaped and embossed. The outer surface of the damper is designed with projections and grooves. Part of the protrusions is formed in the form of movable whiskers 23. Whiskers are designed to lock the damper in the cavity of the profile groove. Part of the protrusions is formed in the form of whiskers for more effective cushioning. Part of the protrusions is formed to compensate external influences on the junction. Joints in the process of operation at the place of its installation. The relief surface of the damper is provided with the specified movable whiskers. This surface dampens shear and longitudinal movements. And also this surface dampens any types of vibrations and vibration loads. Loads occur in the design of the junction due to changes in the geometry of the walls.

[0036] Axial groove is an element of fixation of the mating element of the second part of the locking joint. This groove is made deaf from the back side. And, according to the implementation examples presented in the drawings of Figs. 1, 3, the slot may be shaped. The axial groove 22 may be provided with an extension in the area of the blind base of the groove. The expansion is provided to

encompass the adjacent protrusion 25 on the locking response member. The width of the groove 22 is selected from the condition of possibility. On the one hand, to encompass the mating element of the locking connection. And also the retention of the mating element in the cavity of the groove. And on the other hand, the possibility of displacement of the flange in the cavity of the groove. Displacement to compensate for external influences on the structure. Impacts during the operation of the structure of the junction node and a suspended ceiling. Implementation of a shaped groove helps to improve the efficiency of fixation in his cavity mating element locking. Thereby contributes to the effectiveness of the cushioning effect of the design of the junction as a whole. What is disclosed in the drawings Fig. 1, 3.

[0037] The mating part of the locking joint is a horizontal shelf 24. This flange may be provided at its free end with a rounded protrusion 25 in section. As follows from the presented examples of the implementation of the invention (Figs. 1-3). The protrusion forms a longitudinal cylindrical surface along the flange of the locking response element. The length of the horizontal flange of the locking response element is made higher. The length of the horizontal flange is made higher for fixing the mounting part of the joining assembly at some distance from the supporting surface. It is made higher than the length of the adjacent axial slot of the damper of the second lock junction element. This is possible with the formation of a shadow groove 27. C forming a shadow groove 27 between the ceiling covering and the supporting surface. The presence of the shadow groove between the supporting wall and the installation part contributes to the realization of the compensatory movement of the elements of the lock connection that are docked. The shadow groove between the supporting wall and the mounting part faces the supporting surface with an edge. It increases the efficiency of leveling the impact of adverse loads on the connection of structural elements. The loads are associated with changes in wall geometry. And with the change of loads of different kinds of vibrational and vibration influences. In addition, the shadow groove visually conceals the errors of the mounting connections. This increases the performance characteristics of the claimed solution. It also increases the performance characteristics of the structure of the suspended ceiling equipped with it. The damper 21 can be provided with bends 26 projecting beyond the contour of the C-shaped profile cavity. As can be seen from the examples of implementation presented in the drawings of Figs. 1-3. The bends are arranged around the axial slot of the damper. The bends prevent a direct mating of the metal parts and the housing elements of the mating support and mounting parts of the mating assembly. And also damping vibrations of the structure during its operation (Fig. 2). The opening of the bends 26 simplifies the positioning process. The opening of the bends 26 simplifies the process of positioning the mating element of the locking joint in the groove. And the presence of the expansion in the

area of the blind base of the groove provides effective fixation of the shelf. Fixation of the shelf with the protrusion of the locking response element in the cavity of the groove in operation.

[0038] In embodiments of the claimed solution, the damper in the flange of the groove is made with a small protrusion. It is a protrusion beyond the outer contour of the C-shaped hole. These variants are disclosed in the drawings of Figs. 1 and 3. The damper is provided with internal and external bevels. The bevels are for inserting the retention element into the cavity of the damper groove. These bevels on the protrusions increase the ease of positioning the shelf of the locking element. The bevels increase the ease of positioning when inserting it into the groove cavity. The bevels increase the ease of insertion. This is the result of the spaces formed by the bevels. And also as a result of the mobility of the flexible damper projections. The presence of the projections and making them flexible and movable allows for reliable isolation of the mating metal elements of the structure from each other.

[0039] Each of the above response elements of the locking connection can be installed on both the supporting and the mounting parts. (Figures 1-3) This follows from the embodiments of the claimed solution. Each mating element may be installed with the mandatory formation of a mating pair of the locking connection on the mating parts of the mating assembly. Thus, the drawing in Fig. 1 shows a variant of implementation with the placement of a C-shaped profile with a damper on the mounting part. In its upper part, on the side that faces the supporting surface. In this case, one of the end surfaces of the C-shaped profile lies on the continuation of the vertical panel 3. And the lower part of the profile lies on the continuation of the horizontal mounting flange 4. The solutions shown in the drawings of Figs. 2 and 3 illustrate embodiments of the claimed solution with the arrangement of the C-shaped profile with the damper. Also, the solutions illustrate variants with the arrangement on the support portion of the docking assembly. In the solution that is illustrated in the drawing of FIG. 2, the C-shaped profile is made on a continuation of the backing plate and is made at the bottom of the backing plate. Examples of implementation illustrate possible practical applications of the claimed solution as part of spatial structures.

Examples are shown in the drawings of FIG. 4

[0040] For example, FIG. 4a) represents a variant application of the claimed structure as part of a suspended ceiling installation solution in a space. This space is provided with a supply and exhaust ventilation system. The support portion is arranged around the exhaust housing elements of the ventilation system. The support part is provided with a C-shaped profile with a damper. And the mounting part is provided with the mating part of the locking connection. The mating part of the locking connector in the form of a shelf with a cylindrical protrusion. The

flange is provided with a straight U profile with a groove in the lower part. Support and mounting part is connected to each other by a vertical panel. This solution allows:

- align the level of the ceiling covering and the hood;
- Ensure that the coupled construction elements are isolated;
- minimize the risk of the vibrations of the extraction system influencing the statics of the ceiling.
- Form any spatial solutions. Solutions with any configuration. Including closed contours.

[0041] The supporting part of the junction is attached to the supporting surface. For example, by screwing the support panel to the supporting wall (Fig.1, 2). Or by mounting the support panel into the support surface (Fig.2). The mounting part is connected to the support part by mating the elements of the locking connection:

- The damper and the flange of the mating element;
- by inserting the flange of the mating part into the groove of the damper

[0042] Shock-absorbing connection of the coupling unit is formed. Ceiling cover panels are fastened to the mounting flange of the mounting part from below. Fix the ceiling covering panels with self-tapping screws. Cover the panels from below with an exterior coating. For example, plaster, which is fixed and aligned along the panels and ribs of the installation unit of the mounting part of the junction. With the introduction of plaster in the cavity of the mounting element (Figs. 1, 2). Or with the introduction of a stepped projection in the similar recess (Fig. 3). With a change in the geometry of the walls vibration-, oscillation- or other loads arise. The elastic damper absorbs these effects due to the material properties and configuration of the structure. The damper has a raised surface and flexible whiskers. The damper also absorbs the impact by allowing a corrective displacement of the flange of the locking element in the cavity of the damper groove. Thus, the stability of the structure of the ceiling web is ensured.

[0043] Thus, the claimed solution eliminates the disadvantages known from the prior art solutions. And the claimed solution increases the reliability of the mounting assembly of the suspended ceiling. Increase by cushioning the aforementioned adverse effects on the structure of the suspended ceiling and its attachment node. And, as a consequence, increasing the stability of the suspended ceiling to the loads. Stresses occur during use. This simultaneously enhances the performance characteristics of the suspended ceiling and the ease of installation. The stated solution is easy and ergonomic to use.

[0044] The technology can be applied in any system. In systems where similar suspended coverings are used (ceilings, walls, advertising structures, etc.).

[0045] The above disclosed embodiments of the

claimed solution should be considered as examples which do not limit the scope of patent protection. Consider as explanatory features disclosed in the attached claims.

Claims

1. Mounting assembly for suspended ceiling units comprising:

- a connecting unit with connecting elements,
- a support member,
- the support member comprises a fastening means for fastening a support surface,
- the connection unit comprises an attachment part,
- the attachment part is provided with a means for joining to the surface of the ceiling panels,
- the attachment part has shock-absorbing elements having mating parts,
- the mating parts are provided with coupling elements,
- the coupling elements are formed with counterparts and fastening parts,
- one of the counterparts is provided with an open cavity in the form of C-profile and a damper,
- the damper having locking elements with locking points,
- the counterpart is located on a second part of the coupling.

2. Mounting assembly according to claim 1, wherein the C-profile has an outer contour, wherein the contour has the shape of a parallelepiped, and wherein an area of a cavity inlet is smaller than an area of a side of the cavity.

3. Mounting assembly according to claim 1, wherein the damper is provided with a locking element, wherein the locking element is in the form of a longitudinal slot, the slot is axisymmetric with respect to an entrance hole of the C-shaped profile cavity, wherein the slot is open on the opening side of the cavity, and a response element of the lock connection of the second part of the coupling assembly is made in the form of a longitudinal flange, and the width and length of the groove are selected in order to allow coverage of the response element of the lock connection and its retention in the groove, with a possibility to shift the flange in the groove cavity to compensate external influences on the construction of the joint.

4. Mounting assembly according to claim 3, wherein the damper is made of a resilient material and has a relief-like outer surface, the surface has elevations and depressions over the entire surface and a closed

cavity with a C-shaped profile is formed along the inner surface of the cavity.

5. Mounting assembly according to claim 4, wherein the damper projects beyond the outer contour of the C-shaped hole in the groove orientation, and that the damper is provided with inner and outer bevels.

6. Mounting assembly according to claim 4, wherein that the damper is provided with bends projecting beyond the outer contour of the C-section, and that the bends extend along the flange of the damper groove and around the flange of the C-section cavity inlet.

7. Mounting assembly according to claim 3, wherein that the longitudinal flange of the second part of the locking connection is additionally provided with a projection at the free end.

8. Mounting assembly according to any one of claims 1 to 7, wherein a mounting part is provided with at least one outer horizontal mounting plate for fastening the suspended ceiling, wherein the mounting part is provided with a vertical mounting element for fastening an outer cover of the suspended ceiling panels, wherein the panels are joined together with a vertical panel directed downwardly that a vertical panel arranged below the mounting panel, along the side of the mounting panel, faces the supporting surface.

9. Mounting assembly according to claim 8, wherein that the fitting part is provided with a C-profile, in that the profile is provided with a damper with a locking element for the longitudinal flange of the locking element, and that the locking element is attached to the support part.

10. Mounting assembly according to claim 8, wherein that the carrier section is provided with a C-profile, wherein the profile is provided with a damper with a locking element for the longitudinal flange of the locking element, and wherein the locking element is attached to the fitting part.

11. Mounting assembly according to claim 10, wherein that the upper support part is provided with a supporting vertical shelf, and wherein the shelf is connected to the rear side of the C-section.

12. Mounting assembly according to claim 10, wherein that the support part is formed as a C-profile and wherein the C-profile is built into the carrier part.

13. Mounting assembly according to claim 9, wherein a vertical fastening element of the fastening part is arranged below the plane of the fastening flange, in

that the fastening element is designed as a U-shaped cross-sectional profile, in that the profile includes a transverse flange that the transverse flange is connected by vertical ribs, in that one rib forms part of the vertical plate, in that the second, opposite rib is offset from the first rib by the width of the transverse flange, and that the rib is an inner rib.

14. Mounting assembly according to claim 13, wherein that the vertical fastening element of the mounting assembly has the shape of a U-shaped profile, in that the profile is arranged obliquely to the vertical plate, in that the profile is located below the plane of the fastening flange, in that the transverse flange with lateral projections is formed in the lower free end of the vertical flange, that the vertical, outer and inner ribs are slightly divergent, and that the divergence increases toward the bottom.
15. Mounting assembly according to claim 9, wherein in that the fastener is in the form of a stepped projection, wherein the projection is formed at the free end of the vertical plate, wherein the projection at its lower end is in the form of a short outwardly directed plate, wherein the flange has a vertical, downwardly directed rib at its outer end, wherein the rib is supported on the side, and that the side faces the bearing surface.
16. Mounting assembly according to any one of claims 8-15, wherein that the flange length of the locking element and the length of the slot of the damper are designed such that a shadow groove can be formed, wherein the shadow groove is located between a rib of the fastening element of the fastening part facing the bearing surface and the bearing surface.
17. Mounting assembly according to any one of claims 8 to 15, that the underside of the horizontal flange and/or the inner and/or the outer surface of the fastening element is provided with a raised, toothed surface.

45

50

55

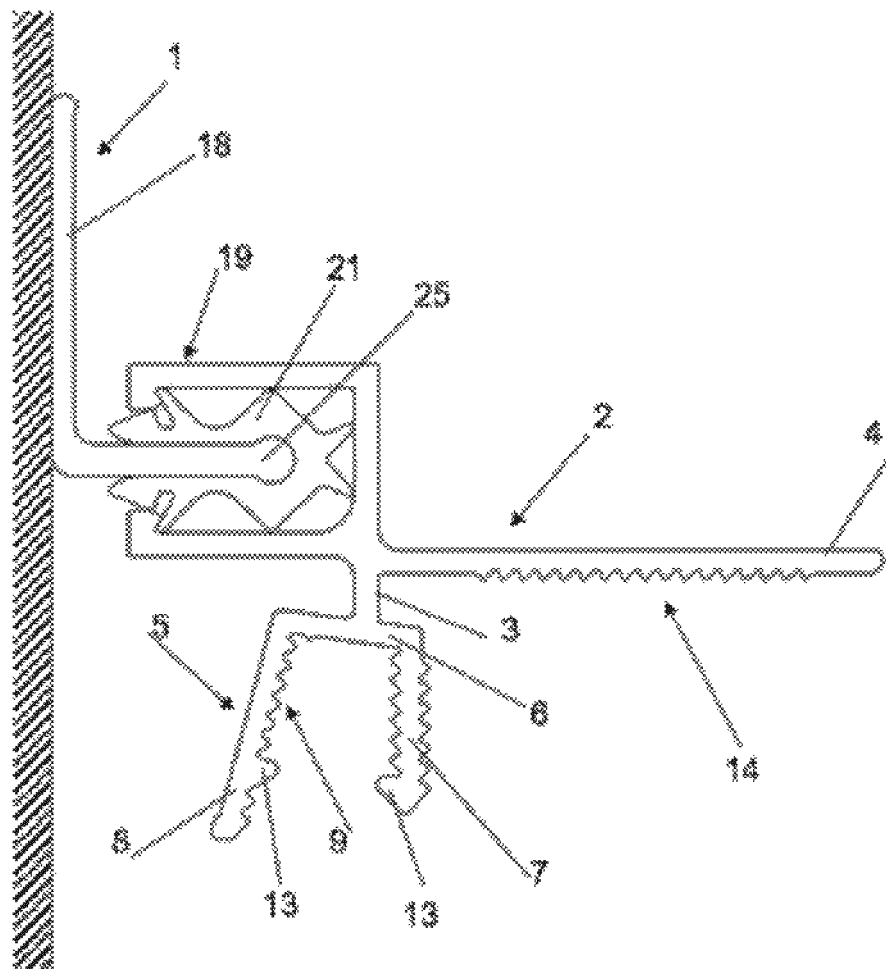


Fig. 1

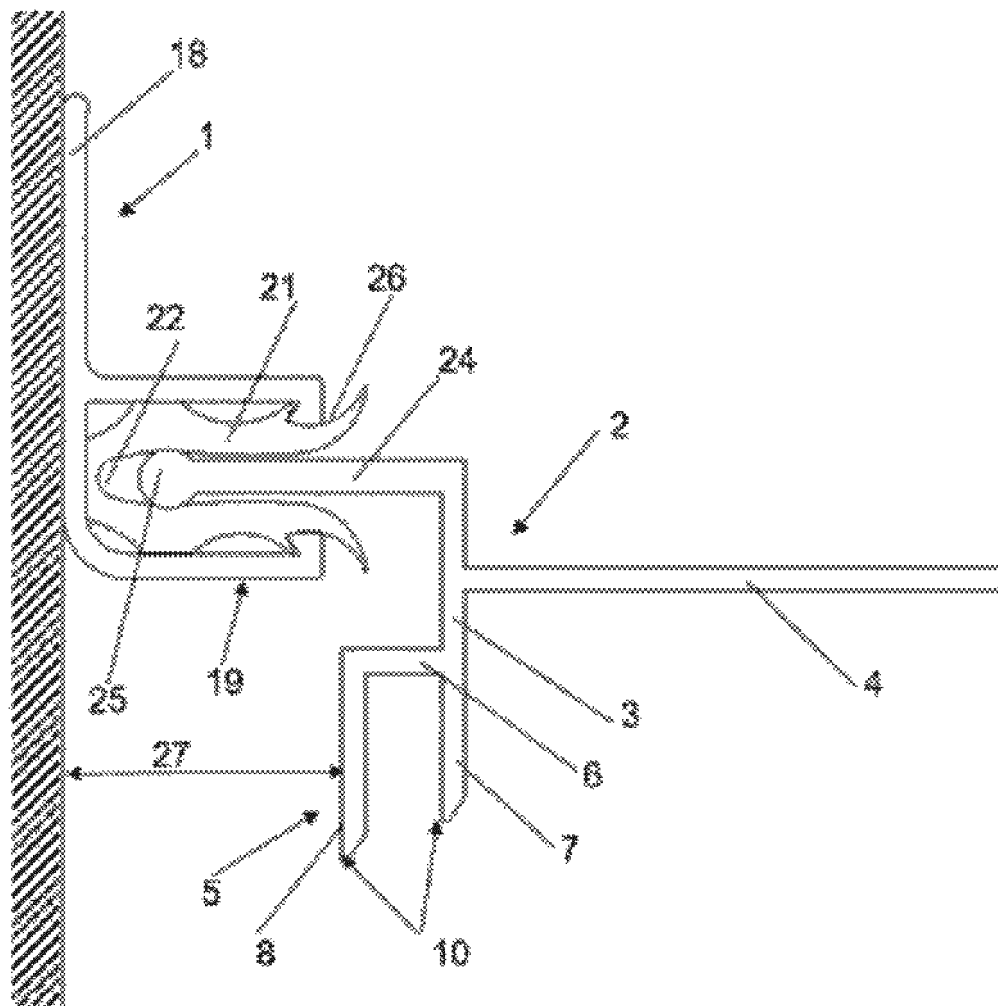


Fig. 2

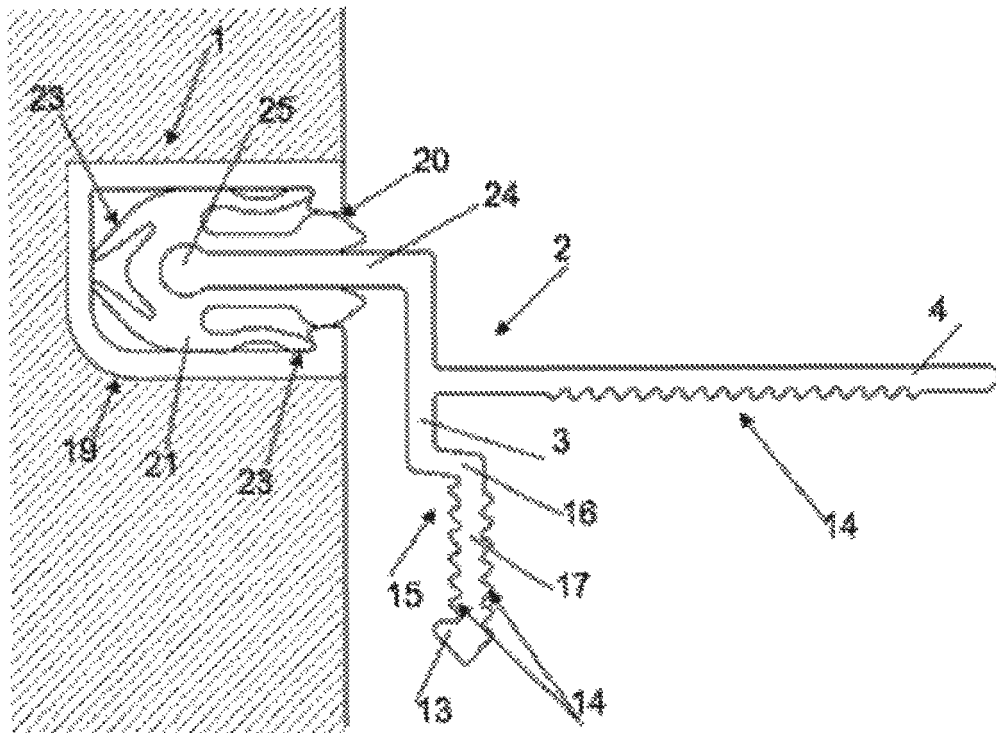


Fig. 3

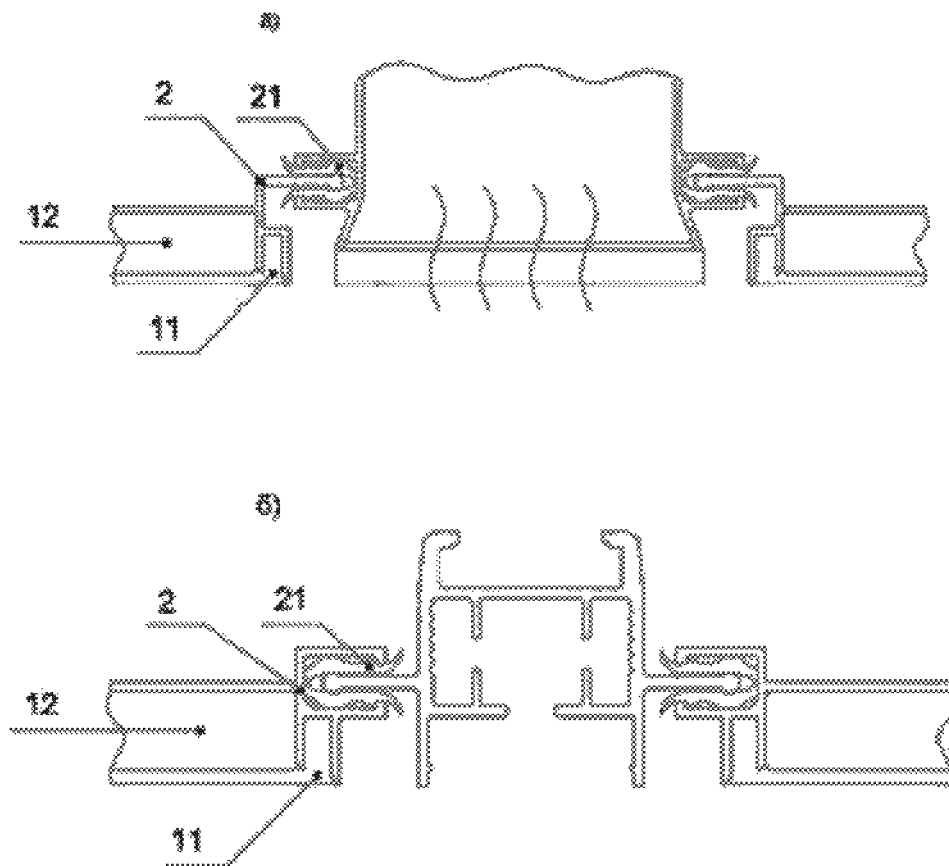


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2021/050167

A. CLASSIFICATION OF SUBJECT MATTER E04B 9/18 (2006.01) E04B 9/22 (2006.01) E04B 9/30 (2006.01) According to International Patent Classification (IPC) or to both national classification and IPC																		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) E04B 9/00, 9/22, 9/18, 9/30 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched																		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PatSearch (RUPTO internal), USPTO, PAJ, K-PION, Esp@cenet, Information Retrieval System of FIPS																		
C. DOCUMENTS CONSIDERED TO BE RELEVANT																		
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>RU 182821 U1 (POLYAKOVA ELENA OLEGOVNA) 04.09.2018</td> <td>1-15</td> </tr> <tr> <td>A</td> <td>RU 180955 U1 (ZHLOBA SERGEY MIKHAILOVICH) 02.07.2018</td> <td>1-15</td> </tr> <tr> <td>A</td> <td>RU 2704170 C1 (PUGACHEV SERGEY JUR'EVICH) 24.10.2019</td> <td>1-15</td> </tr> <tr> <td>A</td> <td>WO 2020/008146 A2 (SCHERRER, JEAN-MARC et al.) 09.01.2020</td> <td>1-15</td> </tr> <tr> <td>A</td> <td>FR 2976307 A1 (SARL DOM INNOV) 14.12.2012</td> <td>1-15</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	RU 182821 U1 (POLYAKOVA ELENA OLEGOVNA) 04.09.2018	1-15	A	RU 180955 U1 (ZHLOBA SERGEY MIKHAILOVICH) 02.07.2018	1-15	A	RU 2704170 C1 (PUGACHEV SERGEY JUR'EVICH) 24.10.2019	1-15	A	WO 2020/008146 A2 (SCHERRER, JEAN-MARC et al.) 09.01.2020	1-15	A	FR 2976307 A1 (SARL DOM INNOV) 14.12.2012	1-15
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.																
A	RU 182821 U1 (POLYAKOVA ELENA OLEGOVNA) 04.09.2018	1-15																
A	RU 180955 U1 (ZHLOBA SERGEY MIKHAILOVICH) 02.07.2018	1-15																
A	RU 2704170 C1 (PUGACHEV SERGEY JUR'EVICH) 24.10.2019	1-15																
A	WO 2020/008146 A2 (SCHERRER, JEAN-MARC et al.) 09.01.2020	1-15																
A	FR 2976307 A1 (SARL DOM INNOV) 14.12.2012	1-15																
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.																		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family																		
Date of the actual completion of the international search 27 August 2021 (27.08.2021)	Date of mailing of the international search report 16 September 2021 (16.09.2021)																	
Name and mailing address of the ISA/ RU Facsimile No.	Authorized officer Telephone No.																	

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/RU 2021/050167

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☒ Claims Nos.: 16, 17
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- RU 16605 U1 [0005]
- RU 182821 U1 [0007]
- RU 16605 [0008]