An adjustable slat (10) for shutters, designed to be coupled with respective angular rotation supports fitted in turn on window opening uprights, the slat being of the type comprises a flat rear side (11) and an opposite side (12) arranged at a certain angle to the previous side. The two sides (11, 12) form a cavity (13) delimited by a side with a curved edge (14), presenting a first coupling area (A), and by the other side with a second curved edge (18) opposite the previous one and specular with respect to the longitudinal centre line and in turn comprising a second area (B) which allows the coupling between adjacent slats. The first coupling area (A) comprises three consecutive housings (15, 16, 17), the internal cavity (17) being delimited by a projection (23) which separates it from the central cavity (16) in turn delimited by a second projection (24) separating it from the outer cavity (15), while the second coupling area (B) comprises protruding longitudinal strips or ribs (19, 20, 21) defined by respective cavities (27, 28). Moreover, the sloping side (12) of the slat (10), close to the second area (B), presents a protruding rib (29), which in cross-section has the shape of a tooth with a partial undercut, designed to engage in a housing (40) of the corresponding support (30), to ensure stable positioning which is fixed with respect to the extraction direction.
Description

TECHNICAL FIELD

[0001] This invention concerns a slat for adjustable shutters which can be combined with a support, also having adjustable elements, for reciprocal coupling in conditions requiring a high proofing level.

[0002] More specifically, the invention refers to a slat for adjustable shutters that is able to achieve the dual purpose of including means with a high proofing level against infiltrations of light, noise, smog, etc. when closed, and secure coupling means which ensure the locking in place on the relative support.

[0003] This slat is constructed with a structure and a coupling shape to ensure a high level of proofing against the weather, light and noise even without sealing strips, and with means for coupling with the relative support to ensure maximum security.

[0004] This invention can be applied in the industry sector for the production of windows and doors, blinds and shutters for home use and more in general in the civil and industrial building sector.

BACKGROUND ART

[0005] It is known that shutters, that is to say mobile structures which can be fitted in the window opening of buildings, are in some cases fitted with adjustable slats which generally consist of a series of sections made from extruded aluminium or other material, with a shape that is substantially flat, of a certain thickness, rectangular and elongated.

[0006] The adjustable slats are fitted on rotating support and movement elements inserted in a frame, and more specifically on two lateral uprights of the frame, which comprise mechanisms able to simultaneously adjust them from a closed position to an open position and vice versa, according to the required inclination.

[0007] These mobile support elements generally consist of a hollow element made from plastic material open towards the inside of the window opening, which comprises an edge shaped in such a way to accommodate and hold the ends of the slats, while the other side rests against the upright to which it is hinged.

[0008] The rotation pin of each element is generally integral with a lever that can be kinematically connected to a mechanical device, for example consisting of a pair of rods, designed to rotate the slats according to the required common inclination.

[0009] The currently known slats and relative supports foresee the use of devices which on one hand are designed to limit the infiltration of light and atmospheric agents, such as dust, and on the other to prevent the removal of the slats by ill-intentioned persons.

[0010] The slats are therefore constructed with particular shaping on the upper and lower edges, that is to say on the opposite longitudinal sides, which are designed to couple with the respective housings cut in the supports.

[0011] According to the Italian patent no 1.228.734 the adjustable slats are constructed by extrusion of a hollow section, the cavity of which is defined by two walls, one of which is substantially inclined with respect to the other one, positioned between two variously shaped longitudinal end portions.

[0012] In particular, the two shaped longitudinal portions which define the upper and lower sides of the slat, comprise coupling elements positioned symmetrically opposite with respect to the centre line, which are shaped in such a way as to comprise at least one sealing strip which fits together with the portion shaped in the opposite direction of the adjacent tab, while the substantially flared shape of the two larger surfaces of the tab determine the housing of the two ends of the tab between the respective adjustable supports fitted on the frame uprights.

[0013] The supports in turn comprise a housing defined by shaped walls of a certain thickness, generally two in number, opposite each other and flared like the slat, between which the ends of the slat are inserted and held in place inside two elbow-shaped areas.

[0014] According to this solution, the use of sealing strips to protect the item against the infiltration of light and dust implies some problems, including the need to create housings in the slat, a relatively difficult operation, as well as requiring assembly stages that affect the production costs, in addition to the purchase cost of the sealing strip itself.

[0015] Another drawback of this solution is represented by the fact that the sealing strips are subject to wear, making it necessary to replace them which, although not a frequent operation, means that the slats have to be removed with considerable labour costs.

[0016] A further drawback of this solution is due to the fact that the slats, once fitted in place, do not comprise retaining means appropriate to prevent break-in attempts, except for one or more projections on the inner side of the support designed to penetrate between the cavities of the slat, which are not, however, sufficient since they allow the slats to be removed from the outside of the shutter.

[0017] According to another document, that is to say the Italian patent no. VR2001A-137 by the same applicant, a solution is proposed which foresees the use of slats equipped with elements designed to prevent the infiltration of light and dust, but in this case without sealing strips.

[0018] To achieve the desired effect, recesses or niches are created in the opposite sides of the slat with a specular arrangement with respect to the central symmetry of the piece. These recesses have an arched base with a central substantially "V"-shaped raised rib, while the external longitudinal upper and lower end portions of the slat have a rounded shape. In this case the arched base of the recess in each slat accommodates
the outer arched portion of the next slat in the closed position, while the "V" shaped raised rib of the first snap-couples with the "V" shaped raised rib of the second.

[0019] In this case it has however been noted that the portions of the slats that couple together without sealing strips do not guarantee perfect proofing against the light and dust coming from outside the shutter, since only one side of the barrier created by the "V" shaped raised ribs coupled together is not in contact with the interior, a totally insufficient condition for the required result.

[0020] According to other solutions, both the slats and the respective adjustable supports can be equipped with means that allow relatively easy positioning of the slat while simultaneously preventing its removal in break-in attempts.

[0021] These means are formed by the creation of tabs cut in the edges of the housing area defined by shaped walls of the support between which the end of the slat is inserted, that is to say in correspondence with the support areas in which the slat is inserted.

[0022] However, although these tabs allow the insertion of the slats they do not guarantee the necessary security to prevent break-in attempts since they face the outside of the shutter and it is sufficient to spread them apart to release the tab from its housing.

[0023] In an attempt to limit this problem, the front and/or rear sides of the slats have, in some cases, been equipped with longitudinal grooves that couple with respective longitudinal protruberances positioned on the support walls, or the supports, specifically the inner side of the supports, are equipped with elastic tabs designed to fit into the hollow housing of the adjustable slat.

[0024] In both cases, the desired effect has been only partially achieved since the contact points of the ribs or the tabs are excessively limited and are not sufficient to prevent removal of the slat, even if combined with the other described restraining means.

DESCRIPTION OF THE INVENTION

[0025] This invention proposes to provide an adjustable slat for a shutter, a support for adjustable slats and a shutter with adjustable slats with a high proofing level, able to eliminate or significantly reduce the drawbacks described above.

[0026] In particular, the solution according to the invention proposes to provide a slat whose main feature is the presence of sections that allow adjacent slats to be coupled together without sealing strips, nevertheless obtaining a very high proofing level against the infiltration of light and atmospheric dust.

[0027] The invention also proposes that the adjustable slat be equipped with protruding ribs, designed to couple with housings in the relative supports, which are positioned on opposite sides with respect to the insertion of the slats so as to prevent or at least limit the possibility of removal from the outside.

[0028] This invention also proposes to provide a slat, a support and a shutter which are easy to produce and assemble in order to be economically advantageous.

[0029] This is achieved by means of a slat, a support and a shutter with the features described in the main claim and according to possible advantageous embodiments indicated in the dependent claims.

[0030] The slat according to the invention substantially consists of a section constructed by extrusion of metallic material, preferably aluminium, or other material suitable for this purpose, and presents a shape which frontally is elongated, rectangular and substantially flat with a certain thickness, while it has a hollow cross-section with an inner chamber delimited by two opposite walls, the inner one being straight and the outer one inclined and protruding outwards to a greater extent near the lower part.

[0031] At the ends of the slat there are raised longitudinal ribs which are designed to be housed in the respective cavities in the adjacent slats when the shutter is closed. According to the invention, the ribs or strips on one side protrude in the opposite direction with respect to the other side, that is to say they are specular with respect to the longitudinal centre line of the slat.

[0032] The cross-section of the slat varies uniformly from one longitudinal edge to the opposite one and more specifically the thickness of the slat increases progressively close to its lower part in the direction of assembly.

[0033] Each longitudinal edge terminates, close to the end, with a curved convex portion.

[0034] The front side of the slat is equipped, close to its innermost part which when fitted is towards the top, with a protruding rib overhang designed to engage the slat in a respective housing in the support.

[0035] The support according to the invention comprises a casing with a base surface delimited by side walls interrupted at each end by a respective opening.

[0036] At least one of the side walls, close to its lower end adjacent to the base surface of the casing, presents a notch designed to provide deformability and elasticity compatible with the preferably plastic material which it is made from.

[0037] At least one side wall of the support has a portion which is curved towards the inside of the casing and equipped with a niche designed to engage with a respective overhang of a slat that can be housed in the support.

[0038] The shutter according to the invention comprises a frame, which can be fixed in a window opening, equipped with uprights with a plurality of pins designed to hold the respective supports in which the slats are housed, the slats presenting transverse ends, projecting from the supports, equipped with cavities and respective strips which are coupled together when the shutter is closed.

[0039] The cavities and strips of the slats act as barriers ensuring perfect closure, when the shutter is closed, against light and the entry of dust of various types.
The absence of rubber sealing strips makes it possible to obtain a slat configuration that can be easily produced by means of extrusion, avoiding the need for cavities or niches which are difficult to create.

Moreover, the arrangement of the parts which allow the reciprocal coupling between the slat and the support ensures the maximum resistance of each slat to attempts at break-in and removal of the slats from the outside, since the retaining means are positioned more towards the inside and thus more distant from the access area and are difficult to reach with normal break-in tools.

Finally, the proofing level ensured by the strips and the respective cavities is long-lasting, not requiring particular maintenance operations except for breakage of the actual parts.

DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention will become evident on reading the description below of one embodiment of the invention, given as a non-binding example, with the help of the drawings in the accompanying figures, in which:

- figure 1 shows a cross-section view of a slat according to the invention;
- figure 2 shows a cross-section view of one of the slat supports;
- figure 3 shows a cross-section view of two slats coupled together and in the closed position;
- figure 4 shows a cross-section schematic view of a detail of the coupling area between one slat and the adjacent slat;
- figure 5 is a schematic axonometric view of the slat;
- figure 6 shows a slat housed in a respective support;
- figures 7 to 9 show stages of insertion of the slat in the respective support.

DESCRIPTION OF ONE EMBODIMENT

In the figures, the reference number 10 indicates in general a slat, in the specific case an adjustable slat for shutters.

The slat 10 comprises a flat rear side 11 and an opposite front side 12 arranged at a certain slope with respect to the other side.

The two sides 11 and 12 form a cavity 13 delimited on one side by a curved edge 14, equipped with a first coupling area indicated globally with A, which includes three consecutive housings 15, 16, 17, and on the other side by a second curved edge 18 opposite to the previous one and specular with respect to the longitudinal centre line and in turn comprising a second coupling area indicated with B, which includes longitudinal protruding strips or ribs 19, 20, 21.

The strips 19, 20, 21 of the second area B of the curved edge 18 protrude on the opposite side with respect to the cavities 15, 16, 17 of the area A of the other edge 14.

The flat side 11 is delimited, close to the edge 14, by a recess 22, curving towards the inside of the slat 10 and with a convex configuration, joining with the inner cavity 17.

This inner cavity 17 is delimited by a first projection 23 which separates it from the central cavity 16, which is in turn delimited by a second projection 24 separating it from the outer cavity 15.

As can be noted, the central cavity 16 is deeper than the cavities 15 and 17, and also has a semicircular concave base.

The walls of the central cavity 16 are also substantially parallel to each other, albeit slightly flared, in order to ensure maximum gripping of the central strip 20 of the subsequent slat when in the closed position.

The edge 18 of the slat 10, close to the hollow body 13, presents a curved concave portion 26 ending with the inner strip 19 separated from the central strip 20 by a flat section 27.

The central strip 20 is in turn separated from the outer strip 21 by a second flat section 28. The central strip 20 protrudes further than the strips 19 and 21 which are the same height.

Finally, the central area of the body of the slat 10 presents protruberances 42, 43 which can be used to centre and guide a possible reinforcement rod (not shown in the figures) which passes through the slat and is inserted in the centrally positioned holes in the slat support.

With reference to figure 3 and to the detail in figure 4, it can be seen that the strips 19, 20, 21 are designed to penetrate the respective cavities 15, 16, 17 of an adjacent slat 10 when the shutter is in the closed position. In these conditions, the arrangement of the slats 10 ensures excellent proofing as well as perfect coupling between the parts in contact.

It can in fact be seen that the walls of the central strip 20 are also substantially parallel to each other, albeit slightly flared, to achieve the perfect penetration in the housing 16 of the opposite area of the next slat.

As can be seen in figure 4, the proofing against light and dust is ensured by the fact that the strips 19 and 21 in the area B create a first barrier from the outside and from the inside of the consecutive closed slats, this barrier being completed and guaranteed by the more complete and efficient penetration and perfect seal of the central strip 20 in the housing 16 of the opposite area A.

The sloping side 12 of the slat, close to the area B, that is to say close to the joining section 26, presents a protruding rib 29, which in cross-section presents the shape of a tooth with a partial undercut, the rib being designed to engage the slat 10 in an appropriate flexible housing of the corresponding support in order to ensure a stable and fixed positioning.
the support towards the opening 36, is formed from a
recess in the base side 32 of the support 30.

This shape of the slat allows it to be inserted in
the respective support 30 starting from the most ta-
ppered part, as shown in figures 7 to 10.

It can also be noted that when the slats 10 are in
the reciprocally closed position, their inner sides 11
are all arranged along the same plane which, when fit-
ted, is approximately vertical, while their outer sides
consecutively form a uniform broken line arrangement,
with the relative protruding parts of the thicker edge 14
all facing downwards.

The support 30 (fig. 2) comprises a side 31 with
a base surface 32 delimited by walls 33 and 34 which
form openings 35 and 36, positioned at each end of the
support 30.

The wall 33 fits together with the sloping side
12 of the slat 10, while the wall 34 fits together with the
straight side 11 of the same slat 10, thereby favouring
the sliding insertion and subsequent locking in place of
the slat, as described below.

The support 30 comprises a side 31 with a
base 32 which presents a recessed portion 37A which,
during insertion of the slat 10, is deformed elastically along the axis Z
parallel to the longitudinal axis of the slat 10, moving
down and then returning to the rest position, thus con-
sstituting another restraining element against the possi-
bility of extracting the slat 10 from the same end that it
was inserted in the support but in the opposite direction.

The slat 10 can be made from lightweight metal
alloy, for example aluminium, while the support 31 can
be made from rigid hard-mix composite plastic or other
similar material suitable for the same purpose.

The invention is described above with refer-
ence to a preferred embodiment. It is nevertheless clear
that the invention is susceptible to numerous variations
that are within the framework of technical equivalents.
Claims

1. An adjustable slat (10) for shutters, designed to be coupled with respective angular rotation supports fitted in turn on window opening uprights, the slat being of the type comprising a flat rear side (11) and an opposite side (12) arranged at a certain angle to the previous side, the two sides (11, 12) forming a cavity (13) delimited by a side with a curved edge (14), presenting a first coupling area (A), and by the other side with a second curved edge (18) opposite the previous one and specular with respect to the longitudinal centre line and in turn comprising a second area (B) which allows the coupling between adjacent slats, characterised in that the first coupling area (A) comprises three consecutive housings (15, 16, 17), the internal cavity (17) being delimited by a projection (23) which separates it from the central cavity (16) in turn delimited by a second projection (24) separating it from the outer cavity (15), while the second coupling area (B) comprises protruding longitudinal strips or ribs (19, 20, 21) defined by respective cavities (27, 28), and in the sloping side (12) of the slat (10), close to the second area (B), presents a protruding rib (29), which in cross-section has the shape of a tooth with a partial undercut, designed to engage in a housing (40) of the corresponding support (30), to ensure stable positioning which is fixed with respect to the extraction direction.

2. An adjustable slat (10) for shutters according to claim 1, characterised in that the strips (19, 20, 21) of the second area (B) protrude from the opposite side with respect to the cavity (15, 16, 17) of the opposite first area (A) of the same slat.

3. An adjustable slat (10) for shutters according to either of the foregoing claims, characterised in that the central cavity (16) of the first area (A) is deeper than the adjacent cavities (15, 17), also having a semicircular concave base (25) designed to accommodate the central strip (20) of the opposite second area (B) of the adjacent slat.

4. An adjustable slat (10) for shutters according to any of the foregoing claims, characterised in that the walls of the central cavity (16) of the first area (A) are substantially parallel to each other, albeit slightly flared, to ensure the insertion and maximum grip of the central strip (20) of the adjacent slat when the shutter is in the closed position.

5. An adjustable slat (10) for shutters according to any of the foregoing claims, characterised in that the second coupling area (B) presents, close to the hollow body (13), a curved concave portion (26) terminating with the inner strip (19) separated from the central strip (20) by a flat section (27).

6. An adjustable slat (10) for shutters according to any of the foregoing claims, characterised in that the central strip (20) of the second coupling area (B) is separated from the outer strip (21) and from the inner strip (19) by a first (27) and a second flat section (28).

7. An adjustable slat (10) for shutters according to claim 6, characterised in that the central strip (20) protrudes further than the strips (19, 21) which are the same height.

8. An adjustable slat (10) for shutters according to any of the foregoing claims, characterised in that the sloping side (12) is equipped, close to the second area (B), with a protruding rib (29), which in cross-section has the shape of a tooth with a partial undercut, the rib being designed to engage the slat (10) in an appropriate housing (40) of the corresponding support, in order to ensure stable and fixed positioning.

9. An adjustable slat (10) for shutters according to any of the foregoing claims, characterised in that the shape of its cross-section varies uniformly from one edge (14) to the other (18) in order to ensure easy insertion in a respective support (30).

10. An adjustable slat (10) for shutters according to any of the foregoing claims, characterised in that the front side (12), that is to say the side facing the outside of the window, slopes towards the second coupling area (B), coming closer to the rear side (11) near the part facing the strips (19, 20 e 21), while it is wider towards the opposite end, reaching the maximum thickness of the slat close to the edge (14) of the first coupling area (A).

11. An adjustable slat (10) for shutters according to any of the foregoing claims, characterised in that the body of the slat presents, in a central inner area, protruberances (42, 43) which can centre and guide a possible reinforcement rod.

12. A support (30) for adjustable slats (10) for shutters, comprising a side (31) with a base surface (32) delimited by walls (33, 34) that form openings (35, 36), positioned at each end of the support (30), characterised in that the part of the wall (33) facing one of the openings (36) terminates with a flexible tab (39) which presents a housing (40) designed to engage the protruding rib (29) of the slat (10).

13. A support (30) for adjustable slats (10) according to claim 12, characterised in that the flexible tab (39) is formed from a recess in the end of the wall (33).
14. A support (30) for adjustable slats (10) according to claim 12, \textit{characterised in that} the base side (32), close to the opening (36), presents a flexible tab (41) designed to be inserted in the cavity (13) of the slat (10) in order to ensure its retention inside the support (30).

15. A support (30) for adjustable slats (10) according to claim 12, \textit{characterised in that} it is inserted in a shutter frame, which can be fixed to a window opening, in turn equipped with uprights with a plurality of pins designed to hold the respective supports (30) in which the slats (10) are housed.

16. A support (30) for adjustable slats (10) according to any of the claims from 12 to 15, \textit{characterised in that} the base of the support presents at least two elastic retaining tabs (41) designed to prevent the slat from being extracted from the same end as it was inserted in the support but in the opposite direction.

17. A support (30) for adjustable slats (10) according to any of the claims from 12 to 16, \textit{characterised in that} it presents a curved wall (37) in the area of the slat insertion opening (35), this curved wall comprising a recessed portion (37A) designed to facilitate the insertion of the slat.

18. A shutter with adjustable slates, \textit{characterised in that} it is equipped with a pair of uprights provided with a plurality of supports (30) according to claims 12 to 17 inside which slats (10) according to claims 1 to 11 are mounted.