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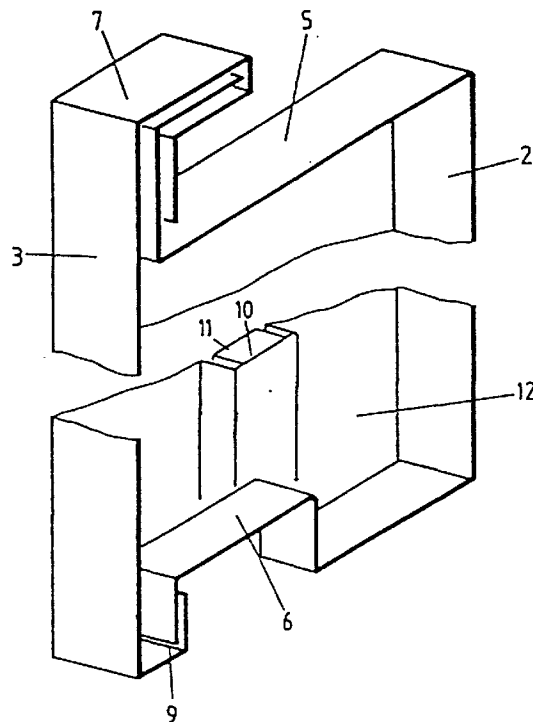
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(54) **Improved metal door**

(57) The object of present invention refers, as the title indicates, to an improved metal door which consists of a leaf (1) made up by two panels or plates (2,3) connected to each other, one inside the other, with a space between them, like a chamber, which is to be filled with

an adequate insulating material and of a metal frame (13) like that used for security doors provided with a set of hinges attached to the door leaf (1) side edge which allows fastening door leaf to frame and making it possible pivoting said door leaf between two end positions.



SECTION C-D
FIG. 3

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Description

The object of present invention refers, as the title indicates, to an improved metal door which consists of a leaf made up by two panels or plates connected to each other, one inside the other, with a space between them, like a chamber, which is to be filled with an adequate insulating material and of a metal frame like that used for security doors provided with a set of hinges attached to the door leaf side edge which allows fastening door leaf to frame and making it possible pivoting said door leaf between two end positions.

Different types of metal doors are widely known, having leaves made up by two panels assembled one into the other, and provided at sides and top with a thin stop flange or rib what provides a poor appearance of whole assembly.

Furthermore, since the assembly of top and side edges between the two door leaf panels is done by sliding, the bottom edge must show a configuration completely different to that of side and top edges, as otherwise it would not be possible the sliding assembly of both panels or plates. Usually bottom edge of one of said panels remains completely exposed, so that oxidation may initiate through said edge and progressively advance towards the other panel or plate, since metal doors are not normally made of steel, as this would be to costly, but materials basically used for this type of door are iron plates adequately treated, like for instance galvanized plates.

Therefore, in this type of known metal doors made by two panels assembled to each other, the panels bottom edges are cut out so one of the said panels or plates remain exposed losing the protection against oxidizing.

On the other hand, the different used known door frames have in their cross section and along the longitudinal shape facing the leaf edge a recess to which the leaf is fastened by means of a hinge assembly consisting of two parts connected respectively to leaf edge and to door frame. However, most of these frames present poor conditions with respect to external actions and specially with respect to forces exerted on connection elements between door leaf and frame.

The improved metal door object of present invention has been developed with the purpose of correcting those defects which appear in the existing doors.

The object of present invention refers to an improved metal door, comprising:

- connection and assembly means between both panels, made up by several bents which define a shape in side and upper and lower edges of both panels, consisting of:

a first U shape defined upon a first or exterior panel extending perpendicular to main plane of said first panel on both side and upper edges;

said first panel lower edge is provided with an oblong groove located perpendicular to said panel main plane.

a second shape defined upon a second or interior panel consisting of a double L shape extending perpendicular to said second panel main plane on both sides and upper edges; said L shape covers said U shape of first panel on its side and upper edges, providing a perfect assembly of better quality than those existing in the market; said second or interior panel defines, in its lower side, an L shape which extends perpendicular to main plane of said second panel used for attaching said oblong groove located in said first panel; and housing means for a lock provided with one or more locking points, preferably a security lock provided with a longitudinal L shape channel arranged on one side of first or exterior panel; said channel houses the lock and also improves panel stiffness, what results in an improved security.

a metal frame, with a longitudinal shape facing door leaf presenting a double 90° step shape, allowing the door leaf to turn around said longitudinal shape to open the door and to define with first of said 90° steps a turning end position which corresponds to door closing position; one or several security hinges made with a preferably metallic material, consisting of two elements, one pivoting around the other, to be attached respectively to door leaf and door frame, allowing the leaf to turn around said frame longitudinal shape, the element attached to frame consisting of an end strip arranged perpendicular to said element main plane, with a 90° bent in its free end, and of size basically similar to that of 90° step of frame to be attached, with the element attached to leaf consisting of an end strip perpendicular to said second element main plane, with length basically similar to that of width of leaf to be attached; and connection and fastening means of each one of the said security hinge elements to, respectively, said door leaf and said frame, consisting preferably of a series of screws with corresponding holes drilled on said hinge end strips as well as on attached elements.

From the previous description it can be clearly seen the advantages of improved metal door object of present invention, like an improved structural resistance of metal door leaf, provision of a wing profile to insure a perfect fastening of a sealing joint housed in an U shape formed by said assembly; conforming a longitudinal U shape channel allows the housing of a lock with several locking points, thus providing a higher stiffness to corresponding panel and a higher security level; furthermore, giving

the possibility of keeping door leaf fastened to frame in a fixed and secure position and of allowing turning door leaf around corresponding frame longitudinal shape between two end positions, with hinges connecting door leaf to frame provided with security elements which can avoid possible damages on area of contact between door leaf and frame as a result of external actions.

To better understand the object of present invention, a preferential practical embodiment of the improved metal door is described as follows, with reference to attached figures 1 to 4. Said figures represent:

Figure 1 shows a perspective view of the improved metal door object of present invention.

Figure 2 shows a section through line AB of metal door leaf shown in figure 1.

Figure 3 shows a section through line CD of metal door shown in figure 1.

Figure 4 refers to a cross section of door leaf and frame assembly by means of a hinge set consisting of two elements pivoting one around the other.

Such as it is represented in figure 1, the leaf (1) of metal door consists of two panels or plates, an exterior panel or plate (2) and an interior panel or plate (3), assembled to each other, one inside the other, Said panels (2, 3), either both or only one may be provided with recesses (4) to hold decor profiles on door leaf A space is left between both panels (2, 3), like a chamber, which is to be filled with an adequate insulating material (12) (see figures 2 and 3) like poliurethane, mineral wool, etc.

Figures 2 and 3 show the sections of door leaf represented in figure 1, as per lines AB and CD respectively, wherein the characteristic features of metal door object of present invention can be seen.

Furthermore, said figures represent connection and assembly means between both panels (2, 3), consisting of several bends which define a profile on side, upper and lower edges of both panels.

Said connection and assembly means comprise:

- a first U shape (5) defined on exterior panel (2) extending perpendicular to main plane of said exterior panel (2) on both sides and upper part, also the said exterior panel (2) lower part is provided, such as it is shown in figure 3, with an oblong channel (6) arranged perpendicular to main plane of said exterior panel (2);
- a second profile defined on interior panel (3) consisting of a double L shape (7) which extends perpendicular to main plane of said interior panel (3) on both sides and upper part, also said interior panel (3) provided, in its lower edge, with an L shape (9) which extends perpendicular to main plane of said interior panel (3), intended to hold said oblong channel (6) arranged on exterior panel (2).

Said double L shape (7) mounted on interior panel (3) covers the U shape (5) of exterior panel (2), on side and upper edges, thus providing a perfect assembly of

better quality than those existing in the market.

Furthermore, leaf (1) of improved metal door is provided with an U shape (10) longitudinal channel mounted on one side edge of exterior panel (2), prepared to house a lock with one or several locking points, like, for example, a security lock. Said channel (10) houses the lock and provides improved stiffness to corresponding panel, improving its security level.

In the case that lock built in improved metal door leaf (1) comprises several locking elements, said U shape longitudinal channel (10) consists of a profile (11) which connects the different locking elements.

It needs to be emphasized that the connection of lower side of both panels (2, 3) defined by oblong channel (6) facing down, arranged on exterior panel (2), with a complementary wing or L shape (9) attached to and lapping over exterior wing provided on interior panel, allows for provision of a brush or seal (not shown in the figures) arranged to stop air flow through space between said door leaf (1) lower side and floor surface.

In accordance with figure 4, improved metal door frame (13) is fastened, by means of a series of hinges, to door leaf (1), through one of door leaf side edges and allowing said leaf (1) to turn around said frame profile between two end positions. The frame (13) which is made of metal or similar material, is provided with a longitudinal shape for connection to door leaf (1) showing a double 90° step (14) shape, consists of two 90° bent adjacent portions.

This double step allows door leaf (1) to turn around the frame (13) profile so as to complete door opening and to define, by means of first step (14a) an end turning position which corresponds with door closing position.

Security hinges are made of a metal material and consist of two elements one pivoting around the other. The means for fastening hinges to door frame consists of an end strip (17) arranged perpendicular to main plane of said element, with its free end (18) bent 90° and of size basically similar to that of one of 90° steps of corresponding frame. The other fastening element corresponds to door leaf (1) and consists of an end strip (19) perpendicular to main plane of fastening element, and with a length basically similar to the width of said door leaf.

Fastening and assembly means for each security hinge element consist of a series of screws (20) with matching holes (21) drilled on both the hinge end strips and on elements to fasten to.

Once the nature of present invention has been thoroughly described, including an embodiment of same, it is only to be added that it will be possible to introduce changes in shape, materials and arrangement in the whole of it as well as in its components, as long as such changes will not substantially affect the characteristics of the invention as claimed hereafter.

Claims

1. Improved metal door, of the type comprising a door leaf f made up by two panels (2, 3) or plates connected to each other, one inside the other, with a space between them, like a chamber, which is to be filled with an adequate insulating material (12) and of a metal frame like that used for security doors provided with a set of hinges attached to the door leaf side edge which allows fastening door leaf to frame and making it possible pivoting said door leaf between two end positions, characterized in that it comprises:
- connection and assembly means between both panels (2, 3), made up by several bents which define a shape in side and upper and lower edges of both panels (2, 3), consisting of:
 - a first U shape (5) defined upon a first or exterior panel (2) extending perpendicular to main plane of said first panel (2) on both side and upper edges; said first panel lower edge is provided with an oblong channel (6) located perpendicular to said panel (2) main plane;
 - a second shape defined upon a second or interior panel (3) consisting of a double L shape (7) extending perpendicular to said second panel (3) main plane on both sides and upper edges; said L shape (7) covers said U shape (5) of first panel on its side and upper edges, providing a perfect assembly of better quality than those existing in the market; said second or interior panel (3) defines, in its lower side, an L shape (9) which extends perpendicular to main plane of said second panel used for attaching said oblong groove (6) located in said first panel (2); and
 - with the assembly of both panels lower edges determined by an oblong channel looking down arranged on one panel, provided with a complementary wing arranged on the other panel fastened and lapped on the exterior wing, and this second panel wing housed inside channel formed on first panel. Such lower assembly of both panels allows for the provision of a brush or seal which will stop any air flow through space between lower door edge and floor surface;
 - means for housing a lock provided with one or several locking points, preferably a security lock, consisting of an U shape longitudinal channel (10) arranged on one of first or exterior panel (2) side edges;
 - a metal frame (13) made of metal or a similar material, with a longitudinal shape facing door leaf (1) presenting a double 90° step shape, allowing the door leaf (1) to turn around said longitudinal shape to open the door and to define with first of said 90° steps (14a) a turning end position which corresponds to door closing position;
 - one or several security hinges (16) made with a preferably metallic material, consisting of two elements, one pivoting around the other, to be attached respectively to door leaf (1) and door frame (13), allowing the leaf (1) to turn around said frame (13) longitudinal shape, the element attached to frame (13) consisting of an end strip (17) arranged perpendicular to said element main plane, with a 90° bent in its free end (18), and of size basically similar to that of 90° step of frame (13) to be attached, with the element attached to leaf (1) consisting of an end strip (19) perpendicular to said second element main plane, with length basically similar to that of width of leaf (1) to be attached; and
 - connection and fastening means of each one of the said security hinge elements to, respectively, said door leaf (1) and said frame (13), consisting preferably of a series of screws (20) with matching holes (21) drilled on said hinge end strips as well as on attached elements.
2. Improved metal door, according to claim 1, characterized in that in case that said lock includes several locking elements, said exterior panel (2) comprises a channel (10) conformed in the longitudinal direction of said exterior panel (2).

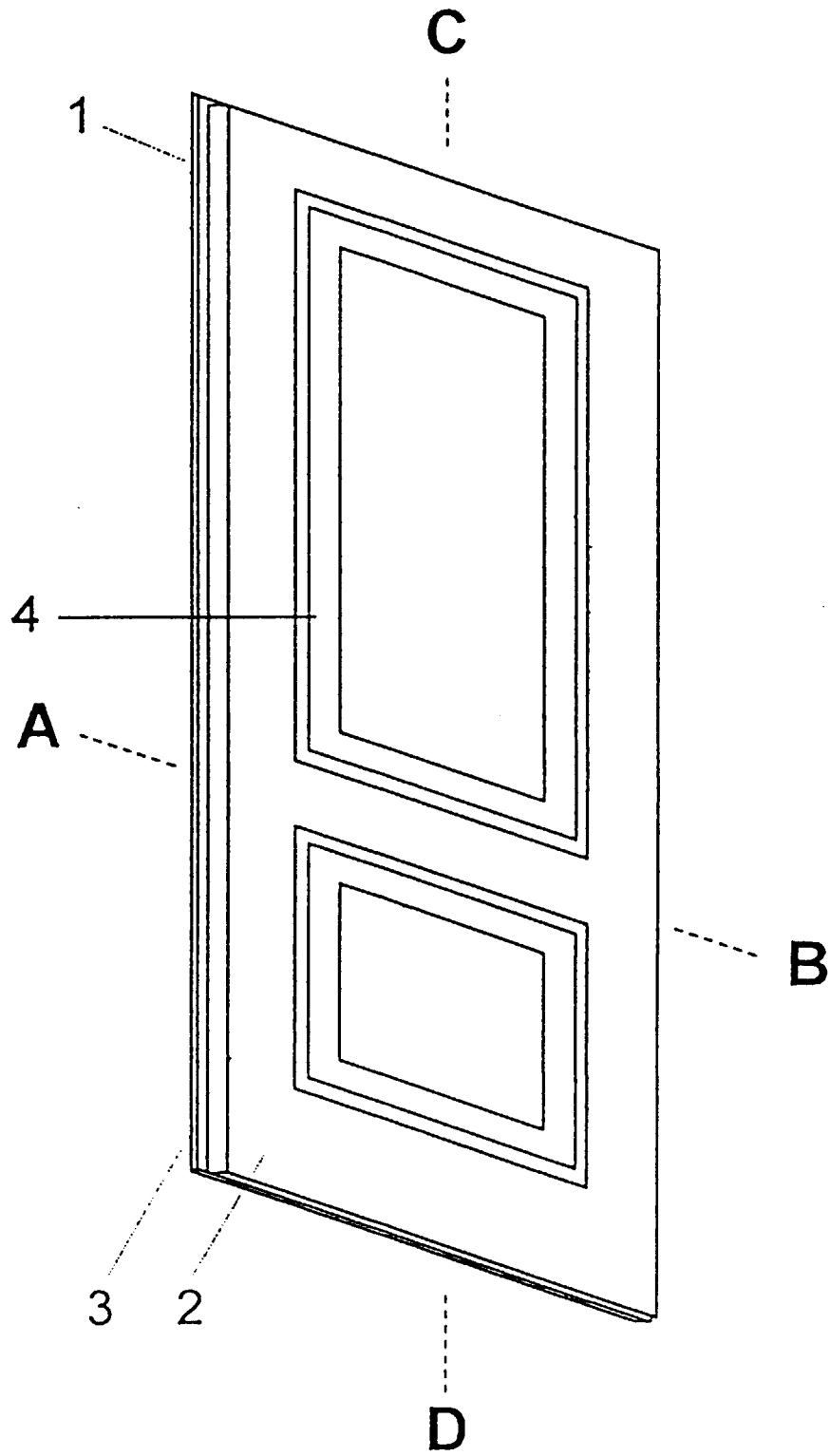
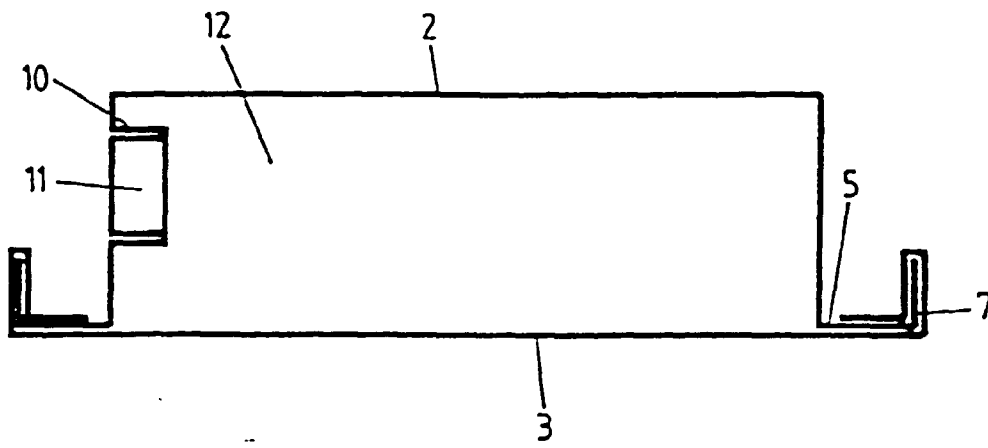
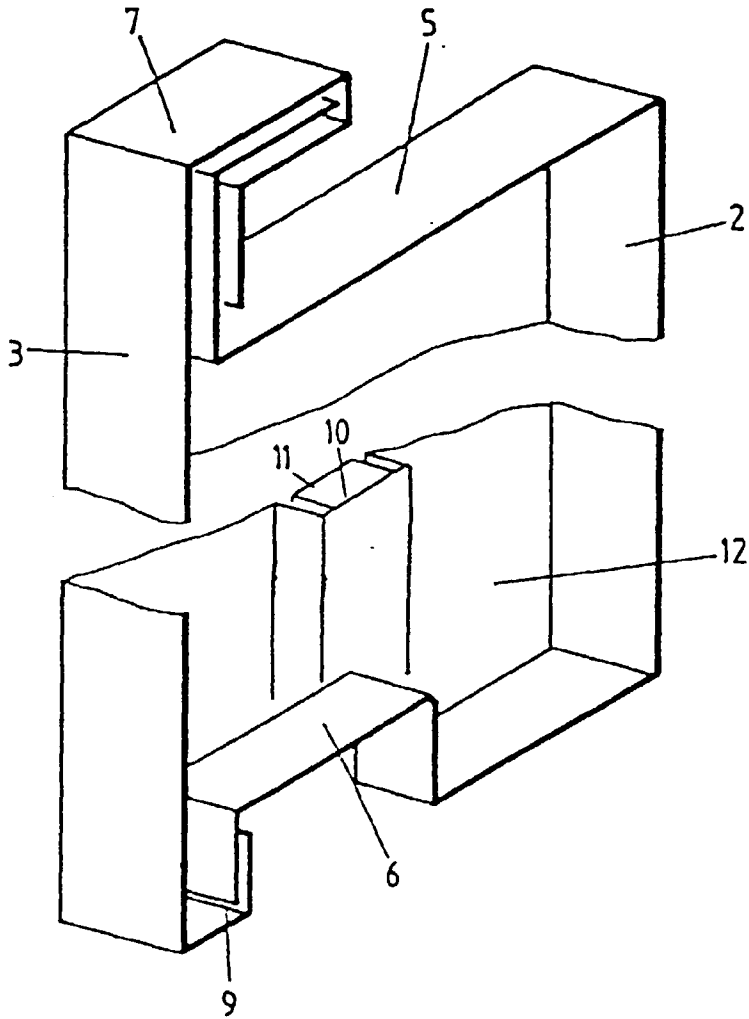


Fig. 1



SECTION A-B
FIG. 2



SECTION C-D
FIG. 3

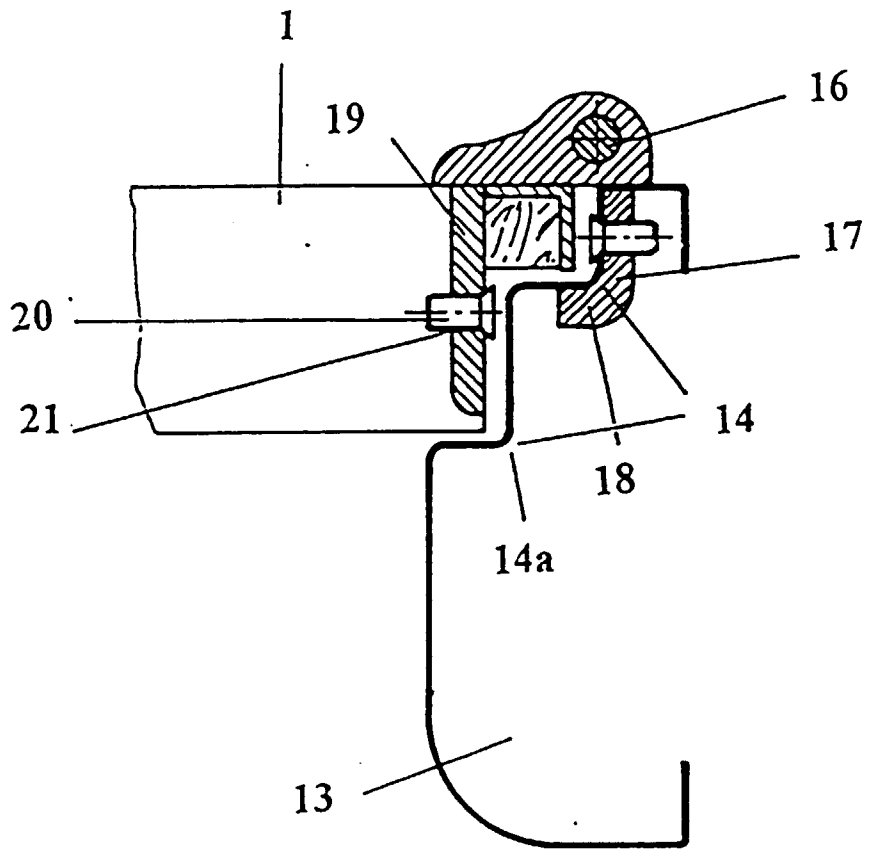


Fig. 4