

MULTIPLE PLATE DOOR

BACKGROUND OF THE INVENTION

5 1. Field of the Invention

The present invention relates to a multiple plate door, particularly to a multiple plate door for protecting against burglars and fire.

10 2. Description of Related Art

A conventional door or window for protecting against burglars and fire with a frame and an outer side usually has a additional plate on the outer side. The additional plate is connected to the frame by additional hinges and made of a suitable material, i.e., of a stable
15 material for protection against burglars and of a fire-resistant material for protection against fire.

However, in a conventional multiple plate door, for mounting the additional plate that gives extra protection on the frame an extra set of hinges is required, as well as an extra lock. Therefore, opening
20 and closing the door is inconvenient. In case of an emergency, if the extra lock is defective, fast evacuation may be delayed or even blocked.

Furthermore, because of the independently mounted plates of a conventional multiple plate door, an enlarged volume for the frame is
25 required, which, together with the extra lock, leads to higher production cost.

SUMMARY OF THE INVENTION

It is therefore the main object of the present invention to provide a multiple plate door with a protecting effect, which is operated like a single-plate door.

Another object of the present invention is to provide a multiple plate door, having an door wing and a protective wing that are linked, forming a single unit, or separated, with the outer wing independently fixed on the door case.

The present invention can be more fully understood by reference to the following description and accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of the multiple plate door of the present invention in the first embodiment.

Fig. 2 is a perspective view of the multiple plate door of the present invention in the first embodiment with the outer wing independently fixed on the door case.

Fig. 3 is a cross-sectional view of the multiple plate door of the present invention in the first embodiment.

Fig. 4 is a schematic illustration of the multiple plate door of the present invention in the first embodiment, with the insertion elements separated from the insertion holes.

Fig. 5 is a schematic illustration of the multiple plate door of the present invention in the first embodiment, with the bolt system of the protective wing closed.

Fig. 6 is a schematic illustration of the multiple plate door of the present invention in the first embodiment, with the bolt system of the protective wing opened.

Fig. 7 is a sectional side view of the bolt system of the present invention in the second embodiment.

Fig. 8 is a cross-sectional view of the multiple plate door of the present invention in the third embodiment.

5 Fig. 9 is a perspective view of the multiple plate door of the present invention in the fourth embodiment.

Fig. 10 is a sectional side view of the multiple plate door of the present invention in the fifth embodiment.

10 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in Figs. 1 - 3, the multiple plate door of the present invention mainly comprises: a door case 10, built into a wall; an door wing 20, hingedly mounted in the door case 10 and having an outer face;
15 a protective wing 30, having an inner face that is connected with the outer face of the door wing 20; several connecting systems 40 for connecting the door wing 20 and the protective wing 30; a bolt system 50 for locking the protective wing 30 separately to the door case 10; and a turning device 60, driving the bolt system 50.

20 The protective wing 30 is made of a suitable material, i.e., of a stable material for protection against burglars and of a fire-resistant material for protection against fire.

The door case 10 has an inner side. As shown in Fig. 3, a hinge set 21 serves to fasten the door wing 20 to the inner side of the door case 10, allowing the door wing 20 to revolve around the hinge set 21
25 for opening and closing the door. As shown in Fig. 1, the door wing 20 has a far end opposite to the hinge set 21. A lock 22 is installed in the far end of the door wing 20 for locking the door wing 20 to the door case 10, when the door is closed. The connecting systems 40 connect
30 the door wing 20 and the protective wing 30, allowing the protective

wing 30 to be separated and independently locked to the door case by the bolt system 50.

5 The protective wing 30 is connected to the door wing 20 rather than directly to the door case 10. The lock 22 is installed on the door wing 20, thus not directly locking the protective wing 30 to the door case 10. A hole 32 in the protective wing 30 allows a user to operate the lock 22 when facing the protective wing 30 connected to the door wing 20.

10 In a first embodiment of the present invention each of the connecting systems 40 comprises an insertion element 41, extending away from the inner face of the protective wing 30, and an insertion hole 42 on the outer face of the door wing 20 on a position that correspond to the insertion element 41. The insertion hole 42 has a wide entrance 421, allowing to take in the insertion element 41 easily.

15 As shown in Fig. 3, for connecting the protective wing 30 with the door wing 20, the insertion element 41 of each connecting system 40 enters the insertion hole 42 thereof, such that the protective wing 30 is fastened to the door wing 20 and moves along therewith.

20 As shown in Figs. 2 and 4, when the bolt system 50 on the protective wing 30 engages with the door case 10 and the user opens the door wing 20, the insertion element 41 of each connecting system 40 leaves the insertion hole 42 thereof, such that the protective wing 30 stays fixed in the door case 10 and the door wing 20 opens independently.

25 For each of the connecting systems 40 alternatively the insertion element 41 is fastened on the outer face of the door wing 20 and the insertion hole 42 is located on the inner face of the protective wing 30, resulting in the same effect as the arrangement described above.

The protective wing 30 is a hollow plate-like body, having two opposite lateral edges and accommodating the bolt system 50. The bolt system 50 has several bolts 51, which move out of the lateral edges of the protective wing 30 or retreat in a linear movement. Several guiding elements 55 guide the bolts 51 in the linear movement thereof. A lever arm 52 drives the linear movement of the bolts 51.

Referring to Figs. 3 and 5, the lever arm 52 is mounted on a secondary shaft 53 on the protective wing 30. Two connecting rods 54 connect the lever arm 52 to the bolts 51. When the lever arm 52 is turned around the secondary shaft 53, the linear movement of the bolts 51 is driven via the connecting rods 54.

As shown in Figs. 3, 5 and 6, the lateral edges of the protective wing 30 have several openings 31, allowing the bolts 51 to pass through. Holes 11 in corresponding positions are cut into the inner side of the door case 10, allowing the bolts 51 to enter. When the protective wing 30 is closed, the bolts 51 are able to enter the holes 11, fixing the protective wing 30.

The turning device 60 is mounted on the door wing 20, allowing the user when facing the door wing 20 to drive the bolt system 50. The turning device 60 comprises: a primary shaft 61, mounted on the door wing 20 and having a far end which points to the secondary shaft 53; a handle 62, fastened to the primary shaft 61 for turning the primary shaft 61; and a first connecting element 63 on the far end of the primary shaft 61. The secondary shaft 53 has a connecting end which extends from the protective wing 30 towards the door wing 20, with a second connecting element 56 fastened thereon. When the protective wing 30 and the door wing 20 are connected, the first connecting element 63 on the primary shaft 61 engages with the second connecting element 56 on the secondary shaft 53.

The first and second connecting elements 63, 56 have a rectangular shape or another shape that allows for engaging. Thus, when the protective wing 30 and the door wing 20 are connected, the secondary shaft 53 rotates along with the primary shaft 61. Then turning the handle 62 results in the linear movement of the bolts 51 in and out of the holes 11, such that the protective wing 30 is fixed in the door case 10 and loosened therefrom, respectively.

For fixing the protective wing 30 stably in the door case 10, without swaying, alternatively two bolt systems 50 are employed.

Besides a horizontal arrangement of the bolts 51, as shown in Figs. 5 and 6, a vertical arrangement is also possible.

Referring again to Fig. 1, the connecting systems 40 allow to connect the protective wing 30 and the door wing 20. Thus the door wing 20 is effectively protected by another layer. On the other hand, the protective wing 30 needs no extra hinges or other fastening elements to be fixed to the door case 10. Therefore the present invention requires only a small volume, as compared to a conventional multiple layer door. No extra lock on the protective wing 30 is needed, saving production cost. With a single lock, the present invention is convenient to use.

Furthermore, when the protective wing 30 is independently fastened to the door case 10, the door wing 20 opens separately, as needed, allowing great flexibility of use. With the door wing 20 closed, the bolt system 50 allows to fix the protective wing 30 additionally, providing good protection against burglars and intruders.

Further variations of the present invention are possible. Referring to Fig. 7, in a second embodiment of the present invention, the bolts 51 are connected by linking rods 57, one linking rod 57 for each of the lateral edges of the protective wing 30. Each of the linking rods 57 is fixed on an extension rod 58, which in turn is connected

to one of the connecting rods 54. Thus the extension rods 58 are driven by turning the lever arm 52. The linking rods 57 allow to drive at least two pairs of bolts 51 by a single lever arm 52 and, accordingly, by a single turning device 60, reducing the number of structural parts needed.

5

Referring to Fig. 8, the present invention in a third embodiment has several connecting systems 40a, each comprising an insertion element 41a and a blocking hole 42a. The blocking hole 42a has an entrance 44a with a width. The insertion element 41a has a head 43a with a diameter that is larger than the width of the entrance 44a of the blocking hole 42a. The head 43a is made of elastic material that allows to be compressed. Thus for each of the connecting systems 40a, when the insertion element 41a has entered the blocking hole 42a, the head 43a is blocked by the entrance 44a from leaving again, such that the protective wing 30 is stably connected with the door wing 20.

10

15

Referring to Fig. 9, the present invention in a fourth embodiment has a first protective wing 30a and a second protective wing 30b. The door wing 20 has an inner face, opposite to the outer face thereof. The first protective wing 30a is connected to the outer face of the door wing 30, while the second protective wing 30b is connected to the inner face of the door wing 30. The first and second protective wings 30a, 30b each have a bolt system of their own, allowing to fix the first and second protective wings 30a, 30b independently on the door case 10. The first and second protective wings 30a, 30b are, as required, made of equal or different protective materials to have equal or different protecting effects, e.g., against either fire or burglars or both.

20

25

Referring to Fig. 10, the present invention in a fifth embodiment has a bolt system 50a, which is mounted on the door case 10. The bolt system 50a comprises: several bolts 51a, moving in the door case 10,

30

entering holes 31a in the protective wing 30 or retreating therefrom;
linking rods 57a, each of the linking rods 57a connecting the bolts
51a next to one lateral edge of the protective wing 30; driving elements
52a, each driving element 52a accessible by the user and driving one
5 linking rod 57a.

While the invention has been described with reference to preferred embodiments thereof, it is to be understood that modifications or variations may be easily made without departing from the spirit of this invention which is defined by the appended claims.

CLAIMS

1. A multiple plate door, comprising:
 - a door case;
 - 5 a door wing, hingedly mounted in said door case and having an outer face;
 - at least one protective wing, which is connectable to said outer face of said door wing;
 - a bolt system, mounted on said protective wing or on said door case, allowing to fasten said protective wing on said door case;
 - 10 and
 - several connecting systems, connecting said protective wing with said door wing when said protective wing covers said outer face of said door wing, further allowing said protective wing to be separated from said door wing.
 - 15
2. A multiple plate door according to claim 1, wherein each of said connecting systems further comprises:
 - an insertion element on said protective wing or on said outer face of said door wing; and
 - 20 an insertion hole on said outer face of said door wing or on said protective wing in a position that allows to accommodate said insertion element, such that said protective wing is connected to said door wing, when covering said outer face of said door wing.
3. A multiple plate door according to claim 2, wherein said insertion hole has a relatively wide entrance for easy entering of said insertion element.
- 25
4. A multiple plate door according to claim 2, wherein said insertion hole has an entrance with a width and said insertion element has a head with a diameter that is slightly larger than said width of said entrance, said head being made of elastic material, such that said
- 30



head is compressed when entering said insertion hole and held inside said insertion hole thereafter.

5 5. A multiple plate door according to claim 1, wherein said door case has an inner side with holes and said bolt system further comprises:

several fixing elements, mounted on said protective wing and movable to extend out of said protective wing into said holes of said door case or to retreat into said protective wing in a linear movement; and

10 at least one driving device, driving said linear movement of said fixing elements.

6. A multiple plate door according to claim 5, wherein said fixing elements are bolts.

15 7. A multiple plate door according to claim 5, wherein said at least one driving device further comprises:

a lever arm, rotatable around a shaft;

connecting rods, connecting said lever arm with said fixing elements, such that said fixing elements are driven in said linear movement by turning said lever arm.

20 8. A multiple plate door according to claim 5, wherein a turning device is mounted on said door wing, driving said driving device of said bolt system, when said protective wing is connected to said door wing, thus causing said linear movement.

25 9. A multiple plate door according to claim 8, wherein said turning device further comprises:

a primary shaft, mounted on said door wing and having a first connecting element;

a handle, fastened to said primary shaft for manually turning said primary shaft; and



a second connecting element, fastened to said bolt system and engaging with said first connecting element, when said protective wing is connected to said door wing, such that operating said handle drives said bolt system, resulting in said linear movement.

5 10. A multiple plate door according to claim 1, wherein said bolt system further comprises several fixing elements, mounted on said door case, and said protective wing has several holes in positions that allow to accommodate said fixing elements.

10 11. A multiple plate door according to claim 10, wherein said bolt system further comprises a driving device for driving said fixing elements.

12. A multiple plate door according to claim 11, wherein said driving device further comprises:

15 a linking rod, linking said fixing elements; and
 a driving element, fastened to said linking rod and accessible from outside said door case.

20 13. A multiple plate door according to claim 6, further comprising a linking rod linking said fixing elements and connected to said driving device, such that said fixing elements are driven simultaneously by said driving device.

14. A multiple plate door according to claim 1, wherein said door wing has an inner face opposite to said outer face, with a second protective wing connected to said inner face of said door wing.

