

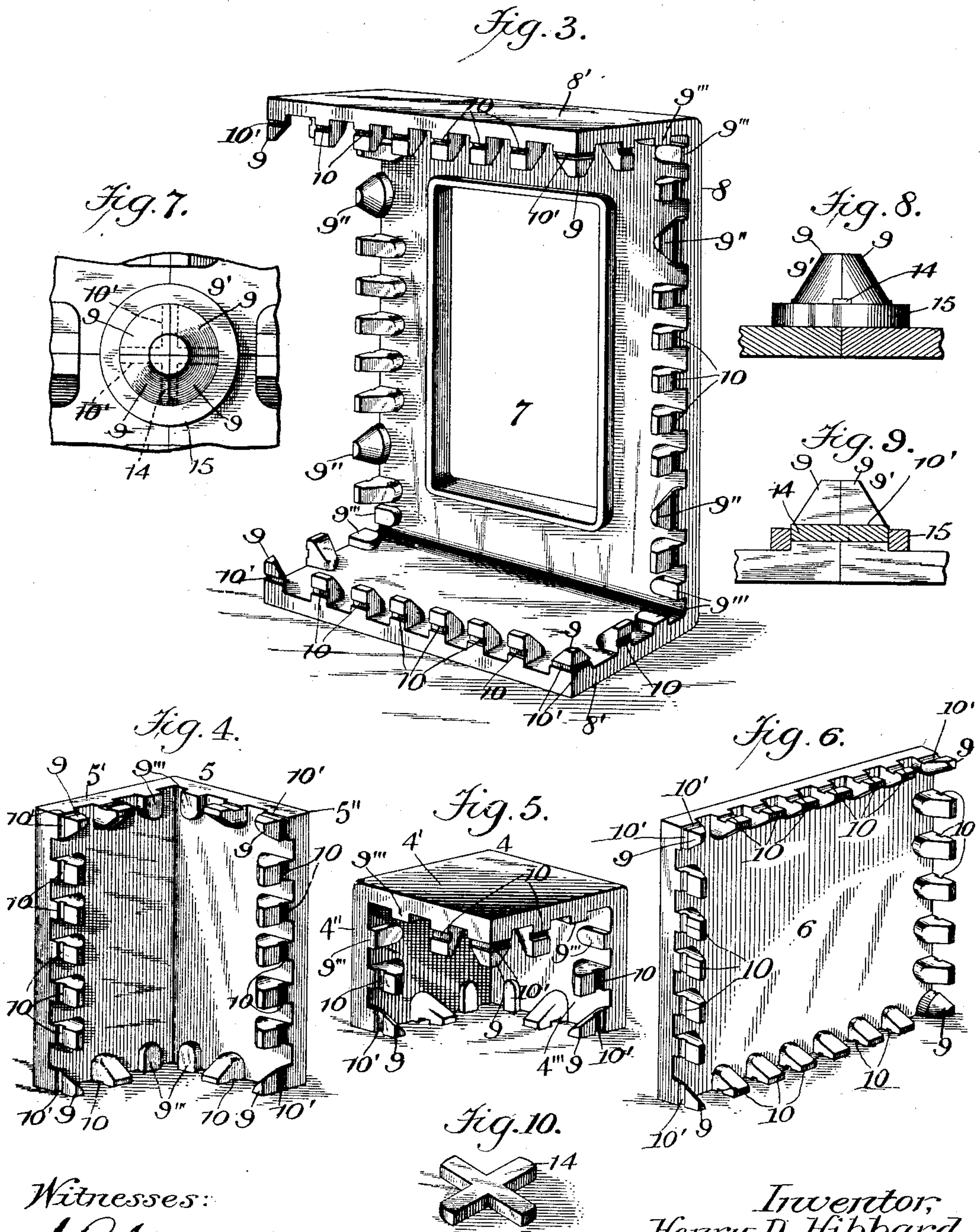
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# UNITED STATES PATENT OFFICE.

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## VAULT.

SPECIFICATION forming part of Letters Patent No. 662,430, dated November 27, 1900.

Application filed March 9, 1900. Serial No. 7,967. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY D. HIBBARD, a citizen of the United States, residing in Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Vaults, of which the following is a specification.

This invention relates to vaults or analogous structures, one object being to provide an improved burglar-proof vault the body of which may be composed of a number of wall plates or components of either angular or non-angular formation united one to another in a somewhat similar manner to the improved safe described and claimed in a contemporaneously-pending application filed March 9, 1900, Serial No. 7,969, whereby the structure presents, in so far as its ability to resist attack is concerned, an integral one.

A further object of the invention is to provide an improved vault composed of a number of wall plates or components of different formations and formed of manganese steel or unmachinable metal united in a firm and rigid manner without requiring tool treatment other than a grinding one of the components to effect such union, and which tool treatment is not practicable with manganese or unmachinable steel.

A further object of the invention is to provide a structure of the character specified in which the plates forming the body thereof are united by means shrunk on parts rigid with said plates, whereby a joint is formed under high pressure—that is to say, the faces of contiguous plates forming a joint are brought or clamped together with great force—thereby giving a high initial resistance which must be overcome before the components can be separated.

A further object of the invention is to provide a structure of the character specified in which a large number of plates, either flat or otherwise formed, may be assembled and united without the integrity of any of them being affected.

A further object of the invention is to provide a vault the body of which is formed of a number of wall components or plates united by the improved means herein set forth, and the corner and edge components of which are

so constructed that the corners and edges of the structure are free of any joint or opening lengthwise of such edges or corners, so that the vault is capable of resisting in the most effective manner any attack which may be made upon it.

In the drawings accompanying and forming part of this specification, Figure 1 represents a perspective view of the body of this improved structure when constructed in accordance with the present invention, a part of such body being broken away more clearly to illustrate the invention. Fig. 2 is a vertical sectional view taken in line *a a*, Fig. 1. Fig. 3 is a perspective view showing the interior of the front component or plate in which the doorway is formed. Fig. 4 is an interior view of one of the edge plates or components. Fig. 5 is an interior view of one of the corner plates or components. Fig. 6 is a view of one of the flat or intermediate plates or components. Figs. 7, 8, and 9 are front, side, and sectional views illustrating the manner of uniting the corners of four plates or components together; and Fig. 10 is a view of one form of key for locating the components in fixed position relatively to one another.

Similar characters of reference designate like parts in the different figures.

The object of the present improvement is to provide a vault or analagous structure the body of which may be composed of a large number of plates or wall components, each of which may be constructed or formed of such high-class materials—as, for instance, manganese steel—that it will withstand burglarious attacks or riots. Since, however, it is not only impracticable but impossible to drill or work with cutting or boring tools upon materials of this character it is necessary to provide means that will unite the components without affecting the integrity or require the removal of any part or parts of said components other than that which may be done by grinding after the same are cast, and which uniting means will not require in the form thereof herein shown the use of bolts or threads, but will be of such a character that it will form practically an integral part of the structure itself.



In the form shown herein this improved vault comprises a body 2, made up of a relatively large number of plates or wall components, which in the present instance comprises a plurality of corner plates or components 4, shown herein as eight in number, a plurality of edge plates or components 5, and a plurality of intermediate relatively flat or non-angular plates or components 6. In the form shown the doorway 7 is formed in a single member or wall component 8 and is usually of sufficient size to permit ready access or entrance to the interior of the vault. This member 8 comprises a front plate, preferably of the height of the vault, provided with a pair of inwardly-extending end plates 8', integral with such front plate. Each corner member or plate 4 comprises a three-part structure comprising three plates 4' 4'' 4''', integrally connected and extending at right angles to each other, while each edge member 5 comprises a pair of plates 5' and 5'', integrally connected and also extending at right angles to each other. The intermediate wall members or plates 6 may be of any desired formation, such as non-angular or relatively flat. These wall members or components are assembled in the manner shown substantially in Fig. 1, it being understood, of course, that there may be any desired number of components, according to the size of the vault or structure to be built. When assembled in the manner shown and described, it will be seen that at the corners where the walls approach each other in three planes a single integral member 4 forms a portion of such three walls of the vault, while at the edges intermediate such corners, where the walls approach each other in two planes, a single integral member 5 forms a portion of such two walls of the vault. This is also the case with the member 8 having the doorway.

Intermediate the corner and edge members the relatively flat plates 6, above set forth, are located, the whole forming a structure corresponding in size with the number of plates used, since it is obvious that intermediate the corner-plates may be disposed a number of edge plates, while intermediate such edge plates and corner-plates may be disposed a number of relatively flat plates. Each of these plates, whether of angular or other formation, is provided along its free edges with a series of inwardly-extending rigid or integral projections located at any desired distance apart, but in the form shown so located that each device for connecting a projection of one plate with that of another will be assembled in close relationship with its companion devices and preferably in contact therewith, although this may not be essential. Each projection of one plate is in position to engage or register with a similar projection of a companion plate or component, and all of such projections have preferably the same formation except the projections located at the free corners of a plate, at

which points the projections are preferably so formed that each constitutes the quadrant of a circle, so that when assembled with three others of like formation a circular member 9' is provided.

For the purpose of locating the components in position relatively to one another each projection is provided on its inner side or face with a slot or recess 10, forming with a similar recess in its companion projection a keyway 12 for the reception of a key 13, whereby the plates are located in proper alinement. The projection at each free corner of a plate is shown provided with a pair of slots or recesses 10', running at right angles to each other. In the form shown the projections are formed with curved exterior faces and flat inner faces, whereby each pair of adjacent plates may be drawn tightly and firmly together, the sides of such projections being preferably straight.

In assembling the members to form the front of the vault it will be seen that the corners of a pair of plates are brought contiguous to the side edges of the doorway-plate and intermediate the upper and lower edges thereof, said front plate being provided at this point with a substantially semicircular projection 9'', whereby it forms, with the projections 9 of a pair of side plates, a circular member 9'.

Instead of using single keys for the keyway formed by four contiguous projections a cross-shaped key 14 may be used, if preferred.

For the purpose of uniting the projections of one component with those of another suitable means is provided. In the form shown this means comprises coupling members in the form of links 15, adapted to be shrunk onto such projections, the keys first being inserted in the keyways. In practice these links are located about midway of the length of the projections, considering the outer faces of the components as a part thereof, such links only partially overlapping the ends of the keys. By this assemblage the keyways will not appreciably impair the strength of the projections, while permitting the ends of the keys to be in sight should this be necessary for any purpose.

From the above it will be seen that when the links (usually of steel) have been shrunk onto the projections, which are formed as a part of the components, such projections constitute levers whose projecting ends form a fulcrum, so that an effective means is obtained for reducing the tendency of any force applied on the outer joint to turn the levers within the links and so permit the joints to open. These links act as retaining devices or instrumentalities applied under high tension or under sufficient tension to resist the opening of the joint and form for all practical purposes an integral structure with the projections.

From the foregoing it will be seen that in



the present organization the corners and edges of the vault are free of any joint or opening lengthwise of such edges or corners and capable of resisting in the most effective manner any attack that may be made upon it.

In practice the projections 9"', formed adjacent to the juncture-point of two components, may be of less length than the other projections and may be unprovided with keyways.

In the present improvement it will be seen that the plates or wall components are of different formations—that is, some are of angular formation, while others are relatively flat, although curved plates could be used in place of such flat plates, if desired, and consequently within the scope of the term "relatively flat non-angular" is to be included all plates other than those of positive angular formation.

If desired, the structure may be provided with a lining, thereby completely to inclose the projections, or shelves may be located intermediate such projections, if desired, and thus increase the capacity of the vault which, however, is not seriously decreased by such projections, although they are of such size and resisting quality that they will resist attack by the use of nitroglycerin or other high explosives.

In conclusion, it has been thoroughly proven by tests that "manganese steel," by which is meant the steel produced and treated in accordance with the Hadfield patented processes, will withstand burglarious or riotous attack. Consequently it follows that the wall components of the character shown will resist all attacks of this character. It therefore remains only necessary so to unite the various components by means that will practically form an integral structure with such components, and thereby permit the formation of joints not penetrable by nitroglycerin or other high explosives. This is accomplished by the provision of a joint such as above set forth, since by shrinking the links on the projections the edges of the wall components are so brought together that so far as penetration is concerned the contiguous plates are integral, so that it is practically impossible to insert nitroglycerin in appreciable quantities sufficient to be effective on the joint, and it is not possible to drill an opening in or at the side of the joint when the vault is constructed of manganese steel. Nor is it believed possible in this construction by the use of high explosives to force the edge of one plate inwardly away from the other plate, this being prevented not only by the coupling means, but also by the keys.

From the foregoing it will be seen that in the present improvement by using the shrunk-on links the joints are formed under high pressure—that is to say, the faces of the components forming a joint are drawn together with great force, thereby giving a high initial resistance, which must be overcome before the

components can be separated in the slightest degree in any attempt to force an entrance into said joint.

Having described my invention, I claim—

1. A vault, the body of which comprises a plurality of angular and non-angular wall components having inwardly-extending projections; and means inclosing or encircling a plurality of projections of a plurality of components for securing them together under tension.

2. A vault, the body of which comprises a plurality of angular and non-angular wall components, each having along each of its edges a plurality of inwardly-extending projections; and means encircling or inclosing a plurality of projections of a plurality of components for holding said components together.

3. A vault, the body of which comprises a plurality of angular and non-angular wall components; and means shrunk on to parts or projections of said components for holding them together.

4. A vault, the body of which comprises a plurality of angular and non-angular wall components constructed and assembled so that the corners and edges of said body are free of joints or openings lengthwise of such edges or corners, each of said components having along each of its free edges a plurality of inwardly-extending projections; and a device located around each set of registering projections of a plurality of components for clamping said components together under tension.

5. A vault, the body of which is comprised of a plurality of angular and non-angular wall components, each of said components having along each of its edges a plurality of inwardly-extending projections, each provided with a slot; and a key located in each keyway formed by a plurality of communicating slots of a plurality of projections for locating said components in fixed alinement relatively to one another.

6. A vault, the body of which comprises a plurality of angular and non-angular wall components having inwardly-extending projections; means for locating the components in fixed alinement relatively to one another; and means encircling or inclosing a plurality of projections of a plurality of components for holding said components together.

7. A vault, the body of which comprises a plurality of angular and non-angular wall components, each of said components having a plurality of inwardly-extending projections, each provided with a slot or recess, the projections of one component registering with the projections of its companion components and the communicating slots thereof forming keyways; a key located in each keyway; and a link located on each set of registering projections for holding the components together.

8. A vault, the body of which comprises a plurality of angular and non-angular wall components, each of said components having along each of its free edges a plurality of in-



wardly-extending projections, each provided with a slot or recess, the projections of one component registering with the projections of its companion components and the communicating slots thereof forming keyways; a key located in each keyway; and a link shrunk on each set of registering projections for holding said components together under tension.

9. A vault, the body of which comprises a plurality of corner components, each comprehending a three-part rigid structure, a plurality of edge components each comprising a two-part rigid structure, and a plurality of intermediate non-angular components, each of said components having along each of its free edges a plurality of inwardly-extending projections, each having a slot therein, the projections of one component registering with the projections of its companion components and the communicating slots thereof forming keyways; keys located in such keyways for locating said components in fixed alinement relatively to one another; and links shrunk on each set of registering projections of a plurality of components for holding them together under tension.

10. A vault the body of which comprises a plurality of angular and relatively flat wall components, each component having a plurality of inwardly-extending projections, the projections of one component registering with those of another; and links shrunk on a plurality of contiguous projections for holding said components together.

11. A vault the body of which comprises a plurality of wall components, each having along its free edges a plurality of projections, the projections of one component registering with those of another; and a link shrunk on to each set of registering projections, each link being in juxtaposition to its companion link or links.

12. A vault comprising a plurality of wall components including a door-carrying component comprising a plate having a doorway and a pair of integral plates located at an angle thereto, and each of said components having inwardly-extending projections, the projections of one component registering with those of another component; and means for securing each set of registering projections together.

13. A vault, the body of which is composed of a plurality of plates, the corners of four of said plates being in juxtaposition; and each of said corners having an integral inwardly-extending projection; and means located on the interior of said body for connecting all of said projections.

14. A vault the body of which is composed of a plurality of plates, the corners of four of said plates being in juxtaposition, and each of said corners having an inwardly-extending projection; and a link shrunk on said projections for uniting the components together.

15. A vault the body of which is composed of a plurality of plates, the corners of four of

said plates being in juxtaposition and each of said corners having an inwardly-extending projection having a pair of slots therein, the slots of one projection communicating with a pair of slots of a pair of projections and forming keyways, and keys located in said keyways.

16. A vault the body of which is composed of a plurality of plates, the corners of four of said plates being in juxtaposition, and each of said corners having an inwardly-extending projection, said projections having a pair of transversely-extending keyways; and a plurality of keys forming an integral cross-shaped member located therein.

17. A vault the body of which is composed of a plurality of plates, the corners of four of said plates being in juxtaposition, and each of said corners having an inwardly-extending projection, said projections having one or more keyways therein; a key or keys located therein and a link shrunk on said projections.

18. A vault the body of which is composed of wall components or plates so assembled that the corners of four plates are in juxtaposition, each of said components having along its free edges a plurality of projections, the projections of one plate cooperating with the projections of its companion plates, and the projections located at the corners of each plate cooperating with a plurality of projections of its companion plates, each set of cooperating projections having a keyway; a key located in said keyway for locating said plates in a fixed position relatively to one another; and a link shrunk on each set of cooperating projections for maintaining said plates in position.

19. A vault-wall component comprising a plate having a pair of integral plates extending at an angle thereto, each of said plates having along each of its edges a plurality of integral projections for the reception on the interior of said component of encircling clamping devices or links, the projections of said angularly-extending plates projecting toward each other.

20. A vault-wall component comprising a plate having a pair of integral plates extending at an angle thereto, each of said plates having along each of its edges a plurality of integral projections, the projections of said angularly-extending plates projecting toward each other, and each of said projections having a slot or groove therein.

21. A vault-wall component comprising a three-sided integral structure having substantially the shape of three sides of a hollow cube, and each of said sides having along each of its free edges a plurality of inwardly-extending integral projections for the reception of encircling clamping devices or links.

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