W. H. HOLLAR.

VAULT.

APPLICATION FILED OCT. 31, 1912.

1,053,815. Patented Feb. 18, 1913.

2 SHEETS—SHEET 1.

FIG. I.

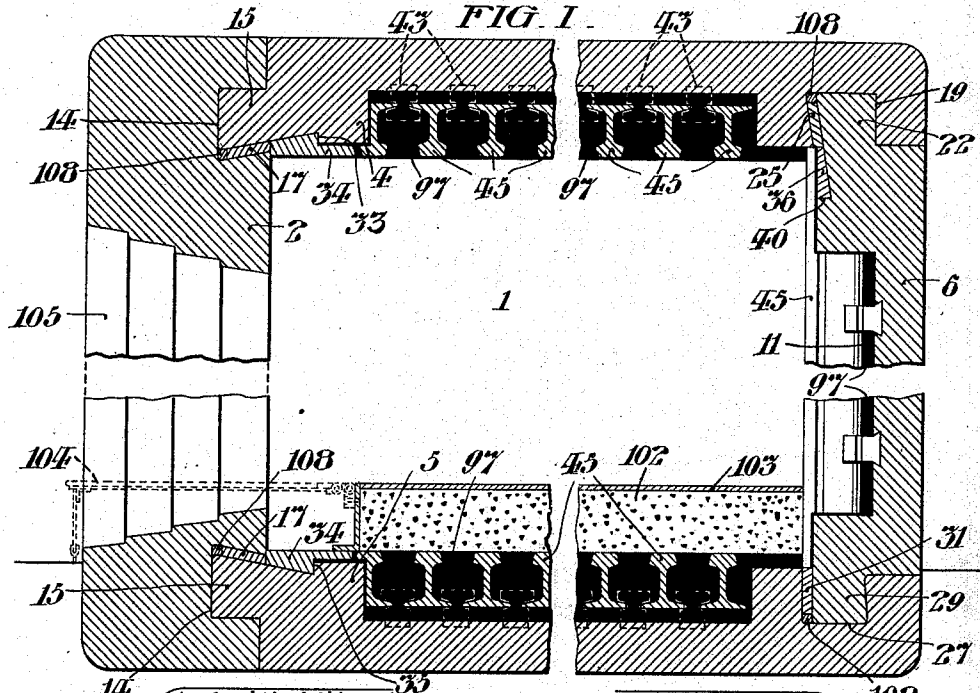
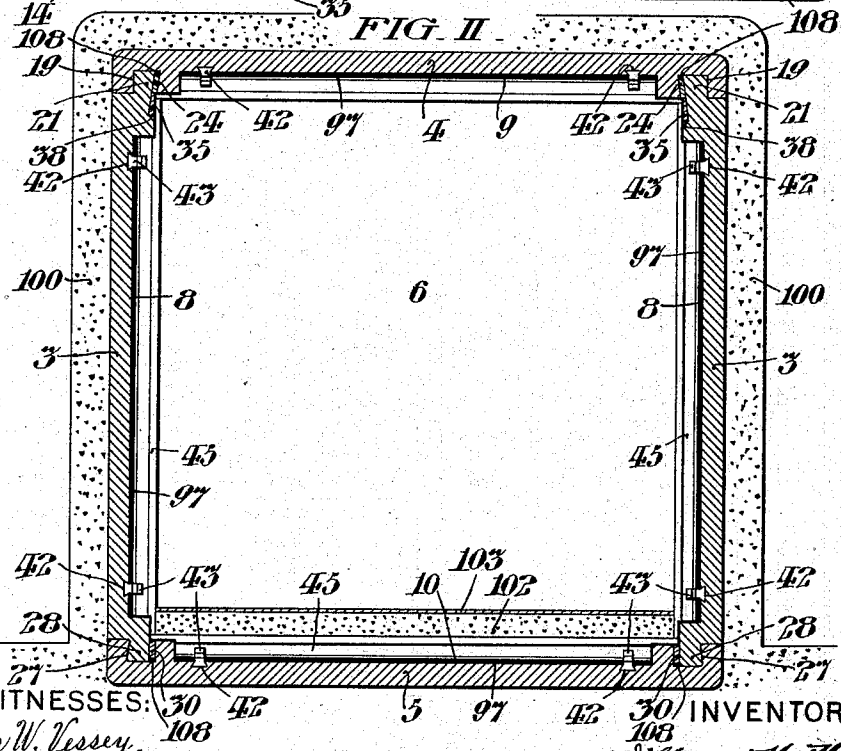


FIG. II.



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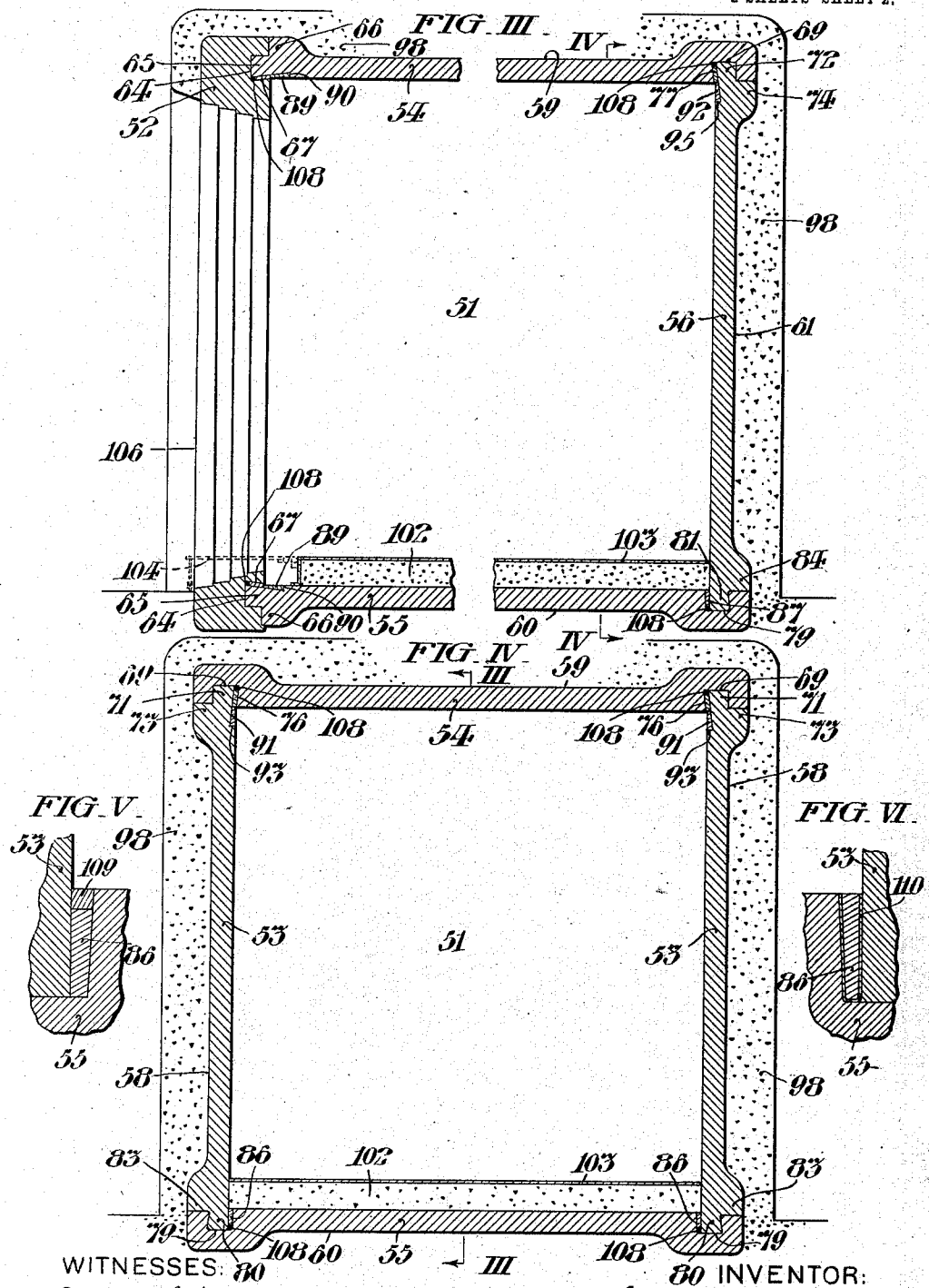
2 SHEETS—SHEET 2.



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VAULT.

1,053,815. Specification of Letters Patent. Patented Feb. 18, 1913.

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To all whom it may concern:

Be it known that I, WILLIAM H. HOLLAR, of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Vaults, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to vaults of the general class described in Letters Patent of the United States 591,188, granted to me October 5th, 1897, wherein the several walls of the inclosure are formed of respective steel armor plates having interlocking means at their junctions. Said patent shows and describes armor plates of the kind then available, being of uniform thickness throughout their extent, and, the interlocking means at the junctions of said walls are such that the armor plates are reduced to approximately one half their thickness in order to interlock as shown in said patent.

It is the object of my present invention to provide armor plates which are adapted to interlock to form a vault inclosure, but which are at least as thick at their interlocked edges as elsewhere throughout the area of the plates, and, as hereinafter described, my invention includes the provision of interlocking flanges on such plates, offset with respect to the plane of the plates.

My invention includes the various novel features of construction and arrangement hereinafter more definitely specified.

In the drawings:—Figure I is a broken, vertical, longitudinal sectional view of a vault conveniently embodying my invention. Fig. II is a vertical transverse sectional view of the vault shown in Fig. I, but on a smaller scale. Fig. III is a broken vertical longitudinal sectional view of a modified form of my invention, taken on the line III, III, in Fig. IV. Fig. IV is a transverse sectional view of the vault shown in Fig. III, taken on the line IV, IV in Fig. III. Figs. V and VI are fragmentary sectional views showing modified forms of sealing means.

Referring to the form of my invention shown in Figs. I and II; the safety vault inclosure 1 is formed by integral and massive metal plates preferably harveyized nickel steel armor plates respectively comprising the front wall 2, side walls 3, top wall 4, bottom wall 5 and rear wall 6 having interlocking flanges and grooves at all of their junctions. The interlocking flanges and grooves of said wall elements 3, 4, 5 and 6 being offset from their respective planes, within said inclosures; said elements are thicker at their margins than intermediate of their area; recesses 8, 9, 10 and 11 being formed in the respective plates intermediate of said marginal offset portions. Said front wall plate 2 has grooves 14 which are undercut at their inner edges, as shown in Fig. I, and interlock with correspondingly shaped flanges 15 which are respectively offset, within the inclosure, from the planes of said side wall plates 3 and top and bottom wall plates 4 and 5; said grooves 14 being of greater width than said flanges 15 interlocked therewith so as to afford spaces for the locking members 17 which are metal strips which, when inserted as shown in Fig. I, lock said walls against separation in any direction. As shown in Figs. I and II; said top plate 4 has grooves 19 at the sides and rear thereof which are undercut at their inner edges and interlock with correspondingly shaped flanges 21 and 22 which are respectively offset, within the inclosure, from the planes of said side wall plates 3 and rear wall plate 6; said grooves 19 being of greater width than said flanges 21 and 22 interlocked therewith so as to afford spaces for the locking members 24 and 25, which like the locking member 17 are metal strips which, when inserted as shown, lock said walls against separation in any direction. Said bottom wall plate has grooves 27 which are undercut at their outer edges, as shown in Figs. I and II, and interlock with correspondingly shaped flanges 28 and 29 which are respectively offset, within said inclosure, from the planes of said side wall plates 3 and rear wall plate 6; said grooves 27 being of greater width than said flanges 28 and 29 interlocked therewith so as to afford spaces for the locking members 30 and 31 which, like the locking members 17 and 25 aforesaid, are metal strips, which, when inserted as shown, lock said walls against separation in any direction. Said locking members 17 are held in position, as indicated in Fig. I, by retaining members 34 which engage shoulders 33 in the side plates 3, top plate 4 and bottom plate 5 and are respectively secured to said plates by any suitable means, conveniently by screws. Similarly, the locking members 24 and 25 are held in position by the retaining devices 35 and 36;

said devices 35 engaging the shoulders 38 on the plates 3, and, said device 36 engaging the shoulder 40 on the plate 6. It may be observed that there is no tendency to displacement of said locking members 30 and 31 and consequently no necessity for providing them with such retaining devices as above described. As shown in Figs. I and II; two series of undercut channels 42 are provided in said recesses 8, 9, 10 and 11 in the respective plates 3, 4, 5 and 6 holding the clamp sockets 43 which extend between opposite flanges of reinforcing members 45, which are of I shaped cross section, and secure said members extending in parallel relation transversely in said recesses. It may be observed that, as shown in Figs. I and II, certain of said reinforcing members 45 are cut away at their ends so as to overlap the offset portions of the plates 5 and 6 and serve as retaining devices for the respective locking members 30 and 31. Moreover, it may also be observed that certain of said reinforcing members 45 are cut away at their ends and overlap the retaining devices 35 and 36, as shown respectively in Figs. II and I, so as to hold said retaining devices in position independently of other means.

Although I find it convenient to employ railroad rails as reinforcing members 45, as indicated in Fig. I, it is to be understood that I do not desire to limit myself to the specific shape of said members.

Although I find it convenient to offset the interlocking members on the respective wall elements of my improved vault inwardly with respect to the inclosure which they form; I do not desire to limit myself to that specific arrangement, as it is obvious that said interlocking members may be offset outwardly with respect to said plates as shown in Figs. III and IV. In said figures; the safety vault inclosure 51 is formed by the metal plates respectively comprising the front wall 52, side walls 53, top wall 54, bottom wall 55 and rear wall 56 having interlocking flanges and grooves at all of their junctions offset from their respective planes, exterior to said inclosure 51; said elements being thicker at their margins than intermediate of their area, and recesses 58, 59, 60 and 61 being formed in the respective plates intermediate of said marginal offset portions. Said front wall plate 52 has grooves 64 which are undercut at their inner edges, as shown in Fig. III, and interlocked with correspondingly shaped flanges 65 and 66 the latter being respectively offset, exterior to the inclosure, from the planes of said side plates 53, top and bottom wall plates 54 and 55; said grooves 64 being of greater width than said flanges 65 interlocked therewith so as to afford spaces for the locking members 67 which are metal strips which, when inserted as shown in Fig. III, lock said walls against separation in any direction. As shown in said Figs. III and IV; said top plate 54 has grooves 69 at the sides and rear thereof which are undercut at their inner edges and interlocked with correspondingly shaped flanges 71 and 72 which are respectively in alinement with the planes of said side wall plates 53 and rear wall plate 56, and, also interlock with the flanges 73 and 74 which are respectively offset, exterior to the inclosure, from the planes of said side and rear wall plates. Said grooves 69 being of greater width than said flanges 71 and 72 interlocked therewith, afford spaces for the locking members 76 and 77, which like the locking members 67 are metal strips which, when inserted as shown, lock said walls against separation in any direction. Said bottom wall plate 55 has grooves 79 which are undercut at their outer edges, as shown in Figs. III and IV, and interlock with correspondingly shaped flanges 80 and 81 which are respectively in alinement with the planes of said side wall plates 53 and rear wall plate 56, and, also interlock with the flanges 83 and 84 which are respectivey offset, exterior to the inclosure, from the planes of said side and rear wall plates. Said grooves 79 being of greater width than said flanges 80 and 81 interlocked therewith, afford spaces for the locking members 86 and 87 which, are metal strips locking said walls against separation in any direction. Said locking members 67 are held in position, as indicated in Fig. III, by retaining members 89 which engage shoulders 90 in the side plates 53, top plate 54 and bottom plate 55 and are respectively secured to said plates by any suitable means. Similarly, the locking members 76 and 77 are held in position by the retaining devices 91 and 92; said devices 91 engaging the shoulders 93 on the plates 53, and, said device 92 engaging the shoulder 95 on the plate 56. It may be observed that there is no tendency to displacement of said locking members 86 and 87 and consequently no necessity for providing them with such retaining devices as above described. As indicated in Fig. I; there is an electrical non-conducting filling 97 in said recesses 8, 9, 10 and 11 extending between said reinforcing members 45 and the armor plate elements. Said filling may be made of any suitable material but is preferably a cement including comminuted corundum, carborundum, or other non-metallic elements harder than steel; so that said filling affords resistance to an attack by either electrical or mechanical means. That is to say, said filling offers resistance to the passage of any current applied for the purpose of fusing an opening into the safety vault inclosure, and offers mechanical resistance to the passage of any drill applied for the purpose of mak-

ing such an opening. Moreover, such an electrical non-conducting filling, in the form of a concrete 98, including non-metillic elements harder than steel, is also provided in the recesses 58, 59, 60 and 61 exterior to the vault inclosure shown in Figs. III and IV and may be advantageously extended, as indicated in said figures, to form a wall inclosing the metal walls aforesaid of the inclosure 51. I also find it advantageous to provide an exterior wall 100, of such concrete, as a protection for the metal walls of the form of my invention shown in Figs. I and II.

Both forms of my invention above described are conveniently provided with floors of concrete 102 faced with metal plates 103 within the respective inclosures 1 and 51 as indicated in Figs. I and III, and, folding step platforms 104 are hingedly connected with said plates 103 so as to be conveniently extended through the respective doorways 105 and 106, when the doors are open, and folded within the respective inclosures when the doors are shut. However, the construction of the interior floors and folding steps is not claimed herein.

In order to prevent the introduction of nitro-glycerin or other liquid explosive, at the junctions of the wall plates aforesaid, I prefer to provide said junctions with sealing means in addition to the locking members above described. For instance, as shown in Figs. I and II, sealing material 108 is inserted in the respective grooves before the locking members are driven therein so as to be deformed, by the locking members, into intimate contact with the contiguous faces of the plates and thus hermetically seal all of the joints between the interlocked plates. Said material 108 may be any substance which is coherent and sufficiently plastic or ductile to be deformed under pressure as above contemplated; for instance, a bituminous cement or a ductile metal may be thus employed. Although I find it advantageous to locate the sealing material, as shown, at the inner edges of the locking members so as to be protected by the latter; I do not desire to limit myself to such construction or arrangement, for, as shown in Fig. V, such material 109 may be located at the outer edges of said locking members so as to be accessible from the interior of the safety vault inclosures without removing said members. Moreover, as shown in Fig. VI, sealing material 110 may be primarily applied to the locking members so as to be carried and deformed by the latter when driven into place.

I do not desire to limit myself to the specific details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention as defined in the appended claims.

I claim:—

1. In a safety vault inclosure, the combination with integral and massive wall elements of steel armor plate; of interlocking flanges and grooves at the junctions of said elements, offset from the respective planes of said elements within the inclosure, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; undercut channels in said recesses; locking members in said grooves, locking said walls together against separation in any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; retaining devices, in said inclosure, arranged to hold said locking members in position; reinforcing members of I cross section extending in parallel relation transversely in said recesses; clamp sockets engaged in said channels and between opposite flanges of said reinforcing members, securing the latter; and, an electrical non-conducting filling in said recesses extending between said reinforcing members and the armor plate elements.

2. In a safety vault inclosure, the combination with integral and massive wall elements of steel armor plate; of interlocking flanges and grooves at the junctions of said elements, offset from the respective planes of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area; locking members in said grooves, locking said walls together against separation in any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; and, retaining devices, arranged to hold said locking members in position.

3. In a safety vault inclosure, the combination with integral and massive wall elements of steel armor plate; of interlocking flanges and grooves at the junctions of said elements, offset from the respective planes of said elements within the inclosure, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; locking members in said grooves, locking said walls together against separation in

any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; retaining devices, in said inclosure, arranged to hold said locking members in position; reinforcing members in said recesses; clamping means securing said reinforcing members in spaced relation to said wall elements; and, an electrical non-conducting filling in said recesses extending between said reinforcing members and the armor plate elements and including non-metallic elements harder than steel.

4. In a safety vault inclosure, the combination with integral and massive wall elements of steel armor plate; of interlocking flanges and grooves at the junctions of said elements, offset from the respective planes of said elements within the inclosure, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; locking members in said grooves, locking said walls together against separation in any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; retaining devices, in said inclosure, arranged to hold said locking members in position; reinforcing members in said recesses; clamping means securing said reinforcing members to said wall elements; and, an electrical non-conducting filling in said recesses including non-metallic elements harder than steel.

5. In a safety vault inclosure, the combination with integral and massive wall elements of steel armor plate; of interlocking flanges and grooves at the junctions of said elements, offset from the respective planes of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; undercut channels in said recesses; locking members in said grooves, locking said walls together against separation in any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; retaining devices, in said inclosure, arranged to hold said locking members in position; reinforcing members extending in said recesses; and, clamp sockets engaged in said pockets and between said reinforcing members, securing the latter.

6. In a safety vault inclosure, the combination with integral and massive wall elements of steel armor plate; of interlocking flanges and grooves at the junctions of said elements, offset from the respective planes of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; locking members in said grooves, locking said walls together against separation in any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; retaining devices, in said inclosures, arranged to hold said locking members in position; reinforcing members in said recesses; and, clamping means securing said reinforcing members to said wall elements.

7. In a safety vault inclosure, the combination with integral and massive wall elements of steel armor plate; of interlocking flanges and grooves at the junctions of said elements, offset from the respective planes of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; locking members in said grooves, locking said walls together against separation in any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; retaining devices, in said inclosure, arranged to hold said locking members in position; and, an electrical non-conducting filling in said recesses.

8. In a safety vault inclosure, the combination with integral and massive wall elements of steel armor plate; of interlocking flanges and grooves at the junctions of said elements offset from the respective planes of said elements; whereby, said elements are thicker at their margins than at the intermediate portion of their area; locking members in said grooves locking said walls together against separation in any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; and, retaining devices arranged to hold said locking members in position; flanged reinforcing members in said recesses; clamp blocks in said recesses and between opposite flanges of said reinforcing members securing the latter; and, an electrical non-conducting filling in said recesses between said reinforcing members.

9. In a safety vault inclosure, the combination with metal plate wall elements; of interlocking flanges and grooves at the

junctions of said elements, offset from the respective planes of said elements; whereby, said elements are thicker at their margins than intermediate of their area; locking members in said grooves, locking said walls together against separation in any direction, the combined strength of the interlocking portions of said elements being substantially double the total strength of the individual elements; and, retaining devices, arranged to hold said locking members in position.

10. In a safety vault inclosure, the combination with metal plate wall elements; of interlocking flanges and grooves at the junctions of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; locking members in said grooves, locking said walls together against separation in any direction; means sealing the joints between said wall elements including ductile metal carried and deformed by said locking members into intimate contact with the contiguous surfaces of said elements, and, retaining devices, arranged to hold said locking members in position.

11. In a safety vault inclosure, the combination with metal plate wall elements; of interlocking flanges and grooves at the junctions of said elements offset from the respective planes of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; locking members in said grooves, locking said walls together; retaining devices, arranged to hold said locking members in position; reinforcing members in said recesses holding said locking members and retaining devices in position; and, clamping means securing said reinforcing members to said wall elements.

12. In a safety vault inclosure, the combination with metal plate wall elements; of interlocking flanges and grooves at the junctions of said elements offset from the respective planes of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; locking members in said grooves, locking said walls together; retaining devices, arranged to hold said locking members in position; reinforcing members in said recesses holding said retaining devices in position; and, clamping means securing said reinforcing members to said wall elements.

13. In a safety vault inclosure, the combination with metal plate wall elements; of interlocking flanges and grooves at the junctions of said elements offset from the respective planes of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; whereby, said elements are thicker at their margins than intermediate of their area, intermediate recesses being formed by said marginal offset portions; locking members in said grooves, locking said walls together; reinforcing members in said recesses holding said locking members in position; and, clamping means securing said reinforcing members to said wall elements.

14. In a safety vault inclosure, the combination with metal plate wall elements; of interlocking flanges and grooves at the junctions of said elements offset from the respective planes of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; locking members in said grooves, locking said walls together; reinforcing members holding said locking members in position; and, clamping means securing said reinforcing members to said wall elements.

15. In a safety vault inclosure, the combination with metal plate wall elements; of interlocking flanges and grooves at the junctions of said elements, certain of the grooves being undercut and of greater width than the flanges interlocked therewith; locking members in said grooves, locking said walls together; reinforcing members holding said locking members in position; and, clamping means securing said reinforcing members to said wall elements.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this thirtieth day of October 1912.

WILLIAM H. HOLLAR.

Witnesses:

ARTHUR E. PAGE,

ETHEL M. IMSCHWEILER.