No. 813,394. PATENTED FEB. 20, 1906.

W. BRINTON.

METHOD OF MAKING SAFES OR VAULTS.

APPLICATION FILED MAY 7, 1904.

Fig. 1.

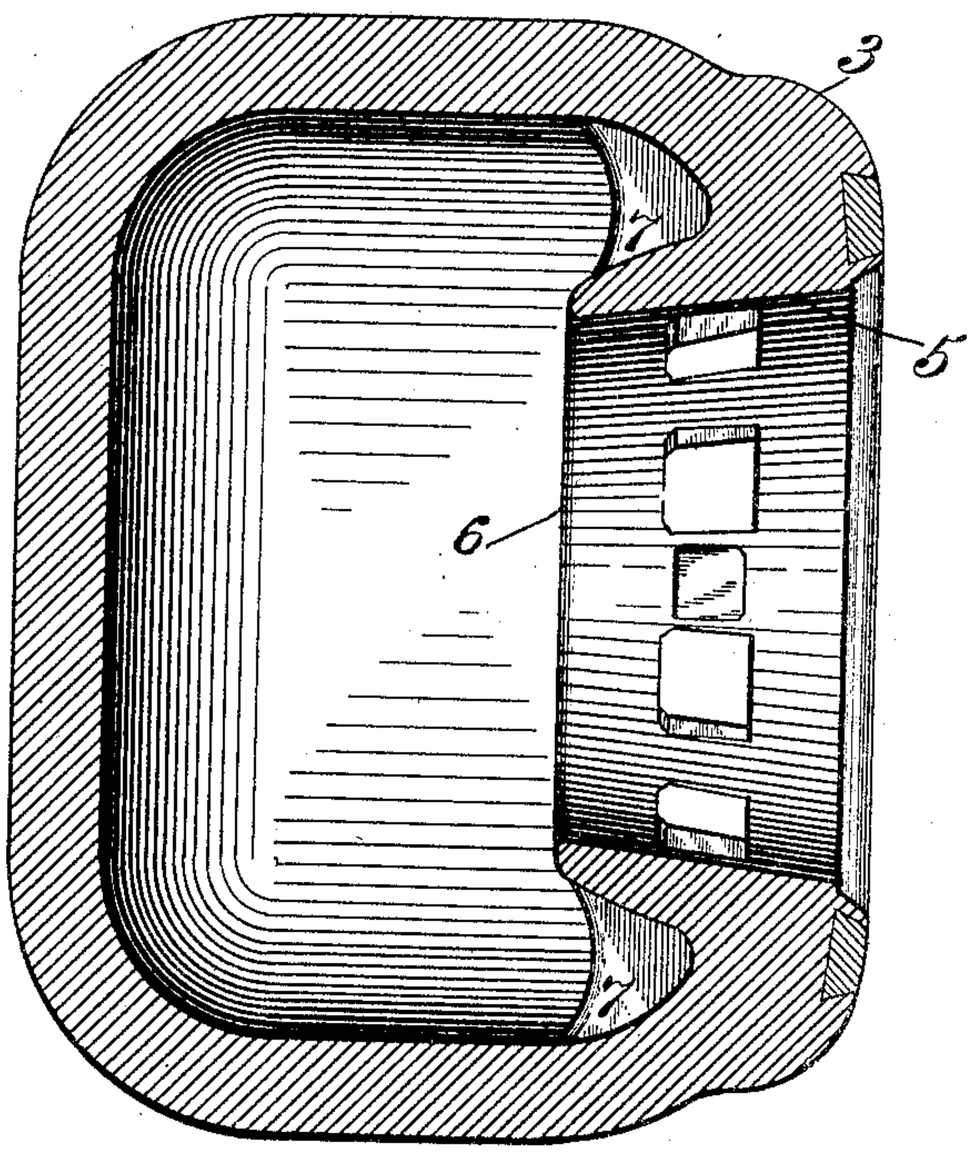



Fig. 2.

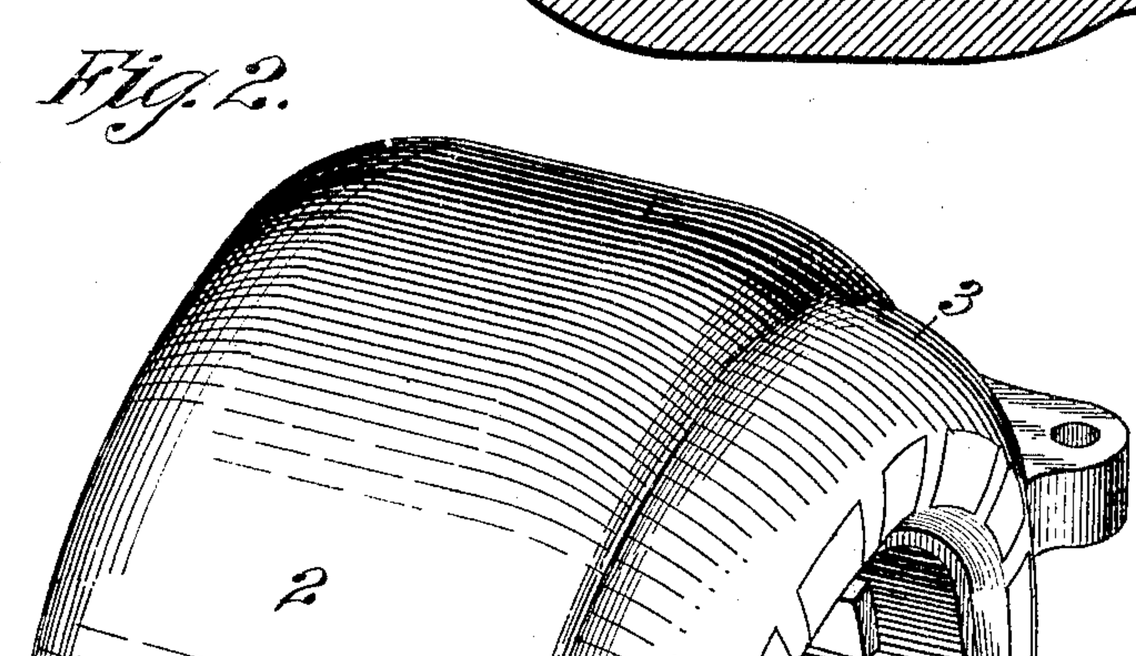
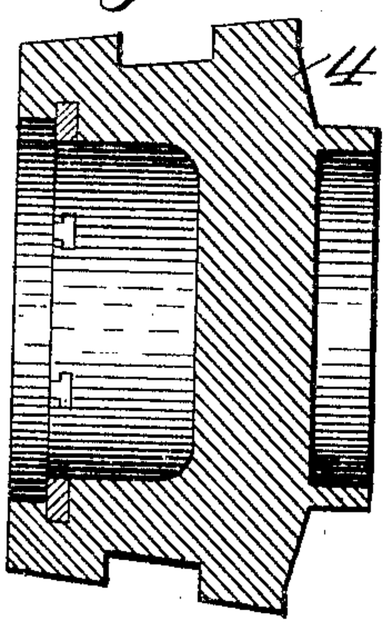



Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## METHOD OF MAKING SAFES OR VAULTS.

No. 813,394. Specification of Letters Patent. Patented Feb. 20, 1906.

Application filed May 7, 1904. Serial No. 206,844.

*To all whom it may concern:*

Be it known that I, WALTER BRINTON, a citizen of the United States, residing in High Bridge, in the county of Hunterdon and State of New Jersey, have invented certain new and useful Improvements in Methods of Making Safes or Vaults, of which the following is a specification.

The present improvement relates to burglar-proof safes and vaults, the object of the invention being to provide an improved method of making a manganese-steel safe or vault or vault member having superior resisting qualities.

In the drawings accompanying and forming part of this specification, Figure 1 is a vertical sectional view of one form of this improved safe or vault body. Fig. 2 is a perspective view thereof, and Fig. 3 is a sectional view of the door.

Similar characters of reference indicate corresponding parts in the different figures of the drawings.

It has been found that superior results are obtained by the use of steel having a predetermined quantity of manganese therein and which has now become well known as "manganese steel" in the manufacture of safes and vaults, since it is practically impossible to drill or cut it, the only practicable machining thereof being by grinding. Consequently a safe or vault formed of this material is drill and saw proof. It is, however, when unheat-treated more or less brittle, so that it is necessary to properly toughen it in order that it will effectively resist the force of high explosives. This has prior to my invention been done by subjecting the casting to heat treatment, which has been carried out by placing the casting when cold or after it has been cooled in a cold furnace and then heated, first slowly and then rapidly, up to a predetermined point, when it is rapidly cooled by immersing it in brine-water or otherwise. Manganese steel, however, is a very difficult and peculiar metal to handle and frequently owing to this rapid cooling immediately after casting an entirely too rapid shrinkage or contraction of the metal takes place, resulting in internal strains which cause cracks and imperfections in the castings, rendering them valueless for the purposes for which they were designed, this being especially true of very large castings or those of intricate design. In order to prevent this too rapid cooling and to further prevent the casting from reaching a point of rest—that is, a point where there is an entire or substantial absence of heat from the casting—and to maintain therein a part of the original casting heat thereof, such part being determined according to the size and character of the casting, the casting as soon as it has solidified sufficient to permit it to be handled, or, in other words, when it has reached a point where its strength is sufficient to retain its own weight without warping, is after being first freed from any parts of the mold which would have a tendency to retard its contraction or shrinkage covered with sand or preferably placed in a pit specially prepared for this purpose where it is free from drafts of air which would tend to rapidly cool it. In this manner the casting is kept at a uniform temperature throughout and the too rapid cooling and consequent too rapid contraction or shrinkage thereof prevented. When the casting has cooled down to the right degree of heat for final toughening, which is determined by the operator and necessarily varies according to the size and character of the casting, superior results having been obtained by maintaining in the casting a certain part of its original casting heat varying between about 100° Fahrenheit—that is to say, above normal atmospheric temperature—and substantially 1,000° Fahrenheit, varying according to the size, design, and character of the casting, it is placed in a heated furnace having a temperature corresponding or substantially corresponding to that of the casting at this time and then heated up, usually rapidly, to a high temperature now well known in the art of toughening manganese steel. The casting is then removed and rapidly cooled, which may be done by immersing it in brine-water or by other suitable means adapted for this purpose. By this method I have been able to successfully produce very large heavy castings entirely free from internal strains.

The safe shown in the present instance made according to this process comprises a body 2 of integral formation, having a projection or flange 3 of peculiar formation, provided with a series of metal inserts located therein during the casting of the structure. These inserts are of such composition as will

be proof against and withstand enormous compressions, thereby insure against any possible peening effect by stretching of the steel of the door-jamb opening by sledging or otherwise, wholly preventing the admission of fluid explosive material. This result has been obtained by forming the inserts of chrome-steel. The jamb 5 of the body projects inwardly beyond the front proper of the body, being formed by a flange 6 free of the side walls of such body, but braced by a series of braces 7 integral with such flange and side walls. This construction affords a very strong jamb from a comparatively small mass of metal. The door 4, of any suitable formation, is likewise of an integral structure and formed in the same manner as the body. A part of the purpose of these inserts is to prevent the peening of the metal adjacent to the door-joints, and they are so designed that when the main safe-body is in the process of casting the fluid manganese steel completely envelops the inserts, which are larger inward than outward—that is, tapered—so that the exposed part which is merely on the surface is of less area than the base or inner surface of the inserts. The inserts are therefore firmly fixed or held in position, making it impossible to loosen or remove from their position except by the destruction of the manganese steel which it is entirely enveloped with. These inserts have several functions to perform in assisting to make the safe-body casting a success from the casting standpoint, therefore insuring a safe-body casting superior to castings heretofore made for this purpose, not only in their value from the point of hardness which they present on the surface of the jamb, but they give very great assistance toward making the main body of the safe-casting solid and perfect because of their tendency to solidify the molten steel by cooling or absorbing the heat at the point in the casting where the greatest amount of heat accumulates and is retained during the pouring of the casting and also during the cooling of the same to the proper degree of heat preparatory to the toughening or treating process, such inserts thus acting as chills and being hardened during the toughening of the safe-body by the heat treatment to which the structure is subjected, as hereinbefore set forth.

The present method of forming and toughening safe or vault bodies is known to be so superior to the method set forth in the Hadfield patents, Nos. 572,892 and 731,540, in which the casting to be toughened is heat-treated from a cold condition or placed in a cold furnace, as hereinbefore described, that not only may it be comparatively rapidly heated up to a predetermined point instead of first slowly and then rapidly, but superior results are obtained even though the casting be not so uniform as has heretofore been deemed necessary for the heat treatment of manganese-steel safe or vault bodies. By the present method of treating manganese-steel safe or vault castings I have been able to successfully treat and perfect a single casting weighing as much as eight and one-half tons, which it is not practicable to do under the processes set forth in the Hadfield patents, and have found that this method also gives superior results with smaller-sized castings.

The subject-matter of this case covering the safe or vault as an article of manufacture has been divided out of this case and will constitute the subject-matter of a separate application now being prepared and to be filed on February 1, 1906.

I claim as my invention—

1. The method of forming a cast, integral, toughened, unmachineable safe or vault member or body which consists in first casting the body with resisting-metal inserts located therein around the doorway thereof, then placing the member or body in a heated furnace and applying the heat until the casting has reached a predetermined temperature, and then plunging the casting in cold water.

2. The method of forming a cast, integral, toughened, unmachineable safe or vault body having a predetermined quantity of manganese therein which consists in first casting the body with resisting-metal inserts located therein around the doorway thereof, and then heating such body, beginning with the furnace in a heated state and with the casting in a heated state, up to a predetermined temperature, and then cooling it.

3. The method of forming a cast, integral, toughened, unmachineable safe or vault body which consists in casting the body with resisting-metal inserts located therein around the doorway thereof, then maintaining in the body a part of its casting heat, determined by the size and design of such body, by checking the cooling of such body at a predetermined point above normal atmospheric temperature, then rapidly heating such body up to a predetermined temperature, and then immersing it in a cooling medium.

4. The method of forming a steel safe or vault member which consists in casting the member into its final shape with resisting-metal inserts located therein along its joint surface, then maintaining therein a part of its casting heat by checking the cooling of such member at a predetermined temperature above normal atmospheric temperature, and then heating said member up to a predetermined temperature and then cooling it.

5. The method of forming a steel safe or vault member having a predetermined quantity of manganese therein which consists in casting the member into its final shape with resisting-metal inserts located therein along its joint surface, then maintaining therein a

part of its casting heat by checking the cooling of such member at a predetermined temperature above normal atmospheric temperature, and then heating said member up to predetermined temperature and then cooling it.

6. The method of forming a manganese-steel safe or vault member which consists in casting the same into its final shape with hard-metal inserts located therein along its joint surface, then maintaining therein a part of its casting heat by checking the cooling of such member at a predetermined point above normal atmospheric temperature, determined by the size and design of the member, then rapidly heating such member up to a predetermined temperature, and then rapidly cooling the same.

7. The method of forming a cast, integral, toughened manganese-steel safe or vault body which consists in casting the body into its final shape with resisting inserts located in such body around the doorway thereof, then maintaining therein a part of its original casting heat by preventing the too rapid cooling of such body, then heating said body up to a predetermined point, and then cooling it.

8. The method of forming a cast, integral, toughened manganese-steel safe or vault body which consists in casting the body into its final shape with chrome-steel inserts located in such body around the doorway thereof, then maintaining therein a part of its original casting heat by checking the cooling of such body, then rapidly heating such body up to a predetermined high temperature, and then immersing said body into a bath to rapidly cool it.

9. The method of forming a cast, integral, toughened steel safe or vault body having a predetermined quantity of manganese therein, which consists in casting the body with a projection or flange around its doorway with resisting-metal inserts in said flange, then maintaining in such body a part of its original casting heat determined according to the size and shape of such body, by checking the cooling thereof at a point above normal atmospheric temperature, then heating the body up to a predetermined high heat, and then rapidly cooling the same.

10. The method of forming a cast, integral, toughened safe or vault body having a predetermined quantity of manganese therein, which consists in first casting the body with resisting-metal inserts located therein around the doorway, then maintaining in the body a part of its original casting heat ranging between a point above normal atmospheric temperature and 1,000° Fahrenheit, determined according to the size and shape of such body, then placing the body in a heated furnace and heating the same rapidly up to a predetermined high temperature, and then rapidly cooling the same by immersion in a cooling medium.

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Witnesses:
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