W. G. NICHOLS.

SAFE.

APPLICATION FILED JUNE 25, 1906.

960,189. **Patented May 31, 1910.**

2 SHEETS—SHEET 1.

Fig. 1

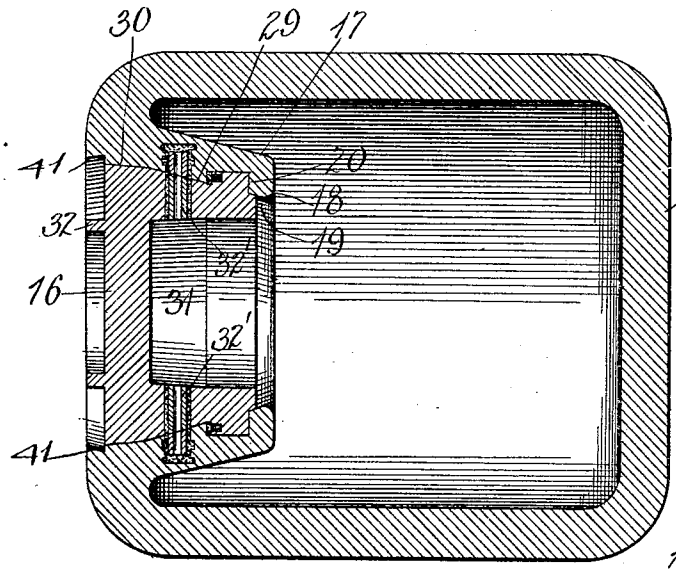


Fig. 2

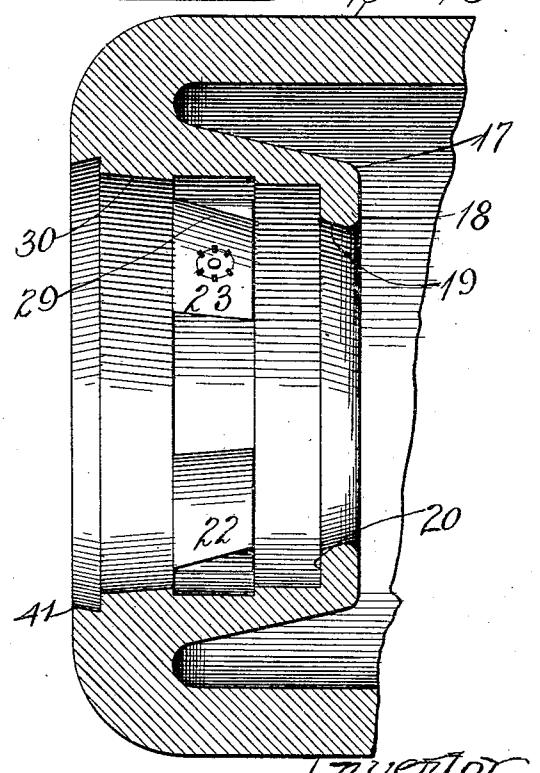
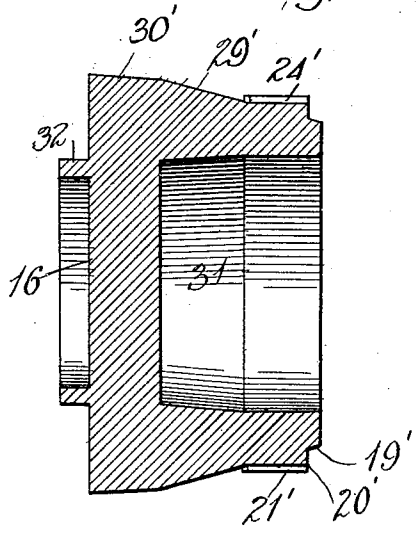


Fig. 3



Witnesses:
Ray White.
Harry R. Lewis

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By Jones Banning and May Attys.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 4

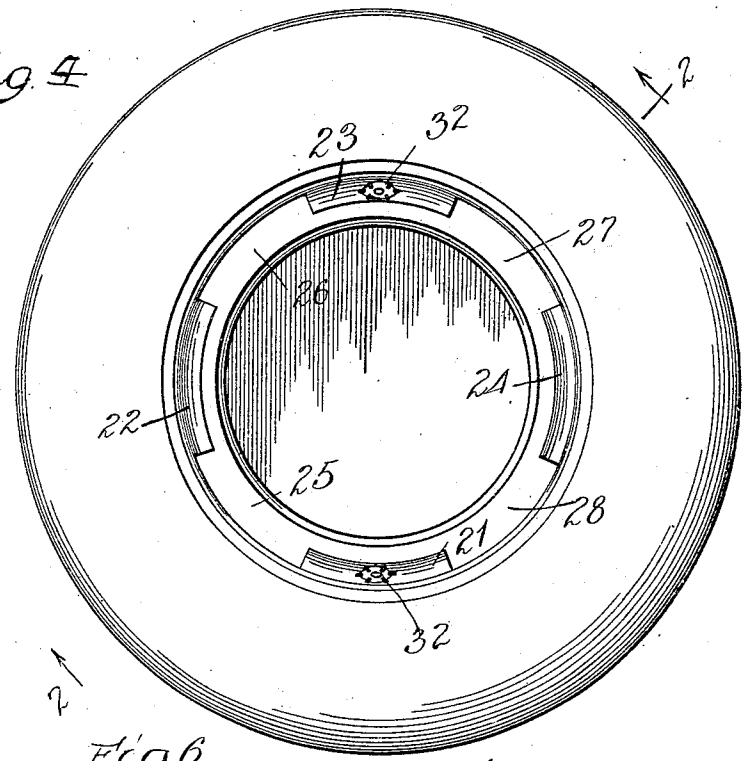


Fig. 6

Fig. 7

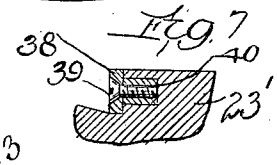


Fig. 8

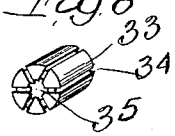


Fig. 5

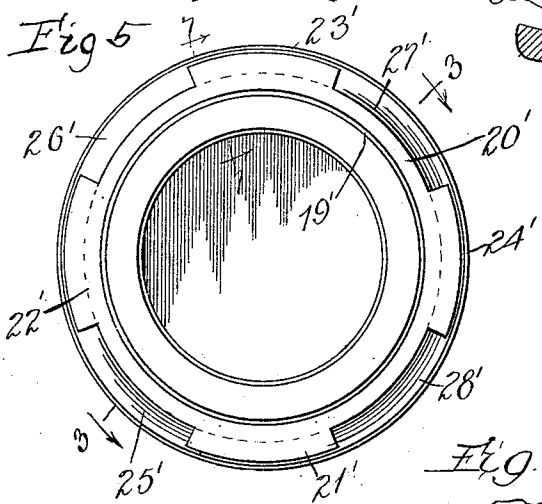


Fig. 9.

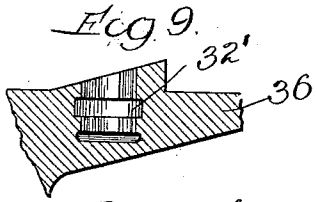


Fig. 10

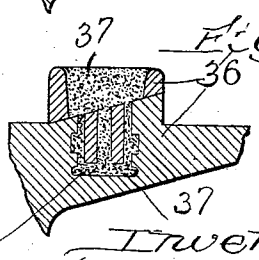
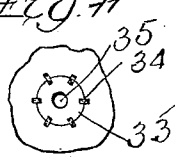


Fig. 11



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By Foster Bain and Mayo Attys

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UNITED STATES PATENT OFFICE.

WESLEY G. NICHOLS, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO AMERICAN BRAKE SHOE & FOUNDRY COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SAFE.

960,189. Specification of Letters Patent. **Patented May 31, 1910.**

Application filed June 25, 1906. Serial No. 323,217.

To all whom it may concern:

Be it known that I, WESLEY G. NICHOLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Safes, of which the following is a specification.

My invention relates to improvements in safes, or vaults, and it more particularly relates to the construction of that class of receptacles known in the art as "burglar-proof" safes.

The salient object of my invention is to provide, in a safe or vault, a construction adapted and arranged to withstand attempts of evil designed persons to surreptitiously effect an entrance therein by the use of liquid or fluid explosives, or otherwise, by first constructing the body part of the safe and door of a material that is relatively refractory to the cutting effect of drills and other tools, and then effecting closeness of fit between the bolt and bolt-receiving perforations by the use of a toolable insert of novel configuration. Second, by so fashioning the opening into the body part of the safe as to preclude the possibility of the introduction of such explosives therebetween. Third, by so shaping, arranging and positioning the portion of the body part, which encompasses the door, when in position, relative to the exterior surface of the body part as to render stretching, by peening, to increase the diameter of said encompassing parts practically impossible, and fourth, by providing a gas-tight joint between the door and said surrounding part, nearest the interior of the safe, to prevent any of the hot products of explosion from entering the interior of said safe, should an explosion, by any means, be produced in or near the door of the safe.

My invention consists, in general terms, of an improved form of door, or closure, and a coacting opening in the body part of the safe, to receive the same.

My invention further consists in the novel and improved construction of portions of the door jamb of the safe.

Other features and objects of my invention will become apparent to those who are skilled in the art from the following description.

In the drawings: Figure 1, is an elevation in section, of a one-piece safe body, with the door or closure in locked position therein. Fig. 2, is an enlarged, broken away, similar view, of a portion of the safe body with the door or closure removed, taken on lines 2—2 of Fig. 4. Fig. 3 is an enlarged, similar view, of the door, or closure, taken on line 3—3 of Fig. 5. Fig. 4 is an end view of the safe body looking into the interior thereof. Fig. 5 is an enlarged end view of the door looking in a direction as from the interior of the safe. Fig. 6 is a fitting plate of toolable material, one of which is adapted to overlie each of the segmental projections of the door. Fig. 7 is an enlarged broken away section, taken on line 7—7 of Fig. 5. Fig. 8 is a perspective view of a soft metal insert. Fig. 9 is a broken away sectional portion of the safe body showing the cavity adapted to receive the insert. Fig. 10 is a similar view showing the insert in place, and a dam to guide the liquid metal in the cavity, which metal is used to retain the insert firmly in place, and with the insert to form a homogeneous mass. Fig. 11 is an end view showing the insert in place.

In all of the views the same numerals of reference indicate similar parts.

15 indicates the body part of the safe, preferably cast in one piece, and composed of a material of a practically refractory nature possessing the qualities of hardness and toughness, so that it is incapable of being drilled or cut in any manner by ordinary cutting tools. A material known in the art as manganese steel I have found from practice to answer the purpose satisfactorily. This material can not be fashioned except by casting and by the use of grinding tools with which emery or like abrasive is employed, and by this latter means the metal is cut away very slowly. Such processes of tooling the material can be used for the purpose of grinding and fitting the parts together. In parts of the safe or vault, and door castings, where it becomes absolutely necessary to drill into or deface the said members or castings, when such operation is impracticable to be performed with emery wheels or the like, the practice has heretofore been to insert rings, or other forms of soft iron or steel, of suitable size in the molds before the castings are made, and thereby provide suitable toolable surfaces,

for the purpose described. Such inserts prevent the freedom of contraction of the casting, when cooling, and thereby produce undue and ununiform strains, which, on account of the high coefficient of contraction of such refractory metal very greatly weaken the castings. In my invention the inserts are made after the casting has been produced, and the castings are, therefore permitted to contract uniformly and are free from any undue strains as in the former illustration.

16 is the door or closure, preferably of like material and partaking of the same general characteristics of the body of the safe. I have not shown a hinge or other means by which the door is attached to the safe body, that feature not forming any part of my invention.

The structure 17, which I characterize the door-jamb, is an annular, inwardly projecting portion, of a shape corresponding to a truncated hollow cone, the conical part being free from contact or connection with the side walls of the safe, so as not to partake of any molecular effect that may be produced by or imparted to the outside shell 15, the cone portion being free to contract or expand and to vibrate, remains unaffected by any effect produced upon the shell. In the construction shown the door-jamb, or the interiorly projecting hollow conical part 17 is perfectly free to contract during the cooling of the casting, thereby preserving its strength by the uniform distribution of the stress as a result of its uniform and equal contraction in all directions. The ring, or flange 18 affording considerable strength and support for the parts, is also a part of the door jamb, between the inner true surfaces of which intimate and gas-tight contact is made with corresponding surfaces of the removable door. The annular, tapered surface 19 and the annular flat surface 20 of the door jamb are adapted to make intimate gas-tight contact with surfaces 19′ and 20′ of the door, as clearly shown in Fig. 1, when the door is in position. The intimate continuity of these surfaces produce a continuous gas-tight broken joint, operating to protect the contents of the safe against hot gases that may result from any attempt to produce an explosion upon, or near, the outer surfaces of the door and jamb. A series of inwardly converging projections, or lugs, 21, 22, 23 and 24 are spaced equi-distant around the inner surface of the door jamb, there being intermediate spaces of substantially equal width between the respective lugs. Corresponding, outwardly projecting lugs 21′, 22′, 23′ and 24′ are placed equi-distant around the door and project in a radial direction therefrom. In the door jamb the intervening space is slightly longer, or wider, than the lugs projecting from the door, in which spaces these lugs enter in the operation of placing the door in position. These spaces I have indicated by reference numerals 25, 26, 27 and 28. Like spaces are shown between the lugs of the door, which spaces are indicated by reference numerals 25′, 26′, 27′ and 28′. It is remarked that the lugs or projections from the door jamb are tapered and such taper is shown at 29. It will be observed that a corresponding tapered annular surface 29′ is provided on the door. This surface is designed to be brought into intimate contact with the tapered surfaces of the lugs, so as to produce a tight supporting fit therebetween. Another surface, preferably tapered to a less degree, is provided on the jamb, and a corresponding surface on the door, these surfaces are continuous, circumferentially, and are adapted to be ground to a close fit in the manner heretofore described, the surfaces are indicated by 30 and 30′ respectively.

31 is a cavity, within the door, within which to contain the lock and the necessary bolts for retaining the door against any attempt to rotate it when the door is locked.

32 is a rim, upon which a geared annulus may be mounted, for the purpose of slightly rotating the door when it is in position for the purpose of bringing the securing lugs in proper juxtaposition and for permitting the lock bolts to register with the sockets made in the door jamb.

It is necessary to prepare a socket in the jamb of the door in which to shoot the bolts of the lock in the act of locking the door, and it is also necessary to prepare perforations in the wall of the door through which the bolts shall take. The material of which the door and body part of the safe are constructed is very tough, hard and of a refractory nature; to such an extent that it is almost impossible to cut it in any way with a tool after the parts have been cast and properly treated by the method used in making manganese castings. In order to provide openings or receptacles of the character described, I cast openings or depressions in the two parts (the door and the safe body) in proper relation, and subsequently fill the openings with a metal, such as wrought iron, which may be subsequently tooled. The filled-in parts of the softer metal being capable of manipulation by the use of the usual proper cutting tools can be bored, or cut, as desired. In the particular instance the inserts of soft metal, after being fixed in the perforations and depressions, are to be drilled or bored so that the bolts of the lock may pass through the series of perforations so made in the inserts in the door, and into like openings in the inserts made in the door jamb. Such a perforation is shown in Fig. 9, 32′ being a depression

cast in the body part of the safe, by the introduction of cores in the flask, as is usual in foundry practice.

An insert 33, preferably of soft iron, is provided with grooves, 34, and a central perforation 35, is placed inside of the cored depression, or aperture, 32′, after the casting has been made, cooled and tempered in the manner described, after which a dam 36, shown in Fig. 10, is placed around the opening, and a suitable material, such as thermit, or the like, is placed in the cavity within the jamb, and caused to melt in the usual manner, in which event fluid metal, such as iron, will flow into and through the perforation 32′ in and around the insert 33 flowing in and through the spaces left between the grooves 34 and the side of the depression, thus filling all spaces in the insert and between the insert and the walls of the depression, with a homogeneous mass of toolable iron, that may be subsequently drilled or otherwise manipulated. To prevent the insert from coming out of the perforation I prefer to cast annular counter-bored grooves in the perforations, or depressions, which cause the molten metal, when cooled, to be formed into a flange-shaped portion, thereby forming a lock. The perforations, or depressions, may be made smooth, however, and a metal which has the characteristic of expanding when cooled, may be used instead of thermit for the purpose described. 37 is the thermit or fluid metal, poured into and around the insert. The spaces between the inserts and perforations in the door portion may be filled with like material and in the same manner.

38 are segmental-shaped plates, of machine steel or other toolable metal, adapted and arranged to overlie each of the lugs 21′, 22′, 23′ and 24′ of the door, being held in position by means of the screws 39, which are let into the soft metal bushings 40, the latter being placed in cored-out apertures made in the said lugs and filled in the manner heretofore described, or in any preferred way.

In the construction of my safe the door and the openings for the bolts of the lock, and the inserts 32 of the jamb, are bored so as to register with the perforations made through the inserts in the door, for the entrance of the bolts when the bolts are shot into these perforations by means of the lock, after the door has been inserted within the door jamb and slightly turned or rotated to bring the respective projecting lugs in proper relative positions. When the door is in the position shown in Fig. 1, with reference to the door jamb, the bolts will pass through the perforations in the door and into the perforations in the jamb, and prevent the door from being turned. In this position the segmental lugs of the door are firmly held between the surface 20 and the under side of the lugs of the door jamb, while a gas-tight joint is provided between the surfaces 19, 19′, 20, 20′, 29, 29′ and 30, 30′.

All metals are subject to being stretched, to a greater or less degree by peening, and persistent peening of the outside casing of a safe, if it is not properly constructed, will have a tendency to enlarge the opening of the door jamb, so as to produce a crack or space between the peripheral outer surface of the door and the corresponding part of the jamb, into which liquid or gaseous material may be inserted and used with disastrous results. To prevent the effect produced by peening of the outside surface of the casing, I provide an abrupt, angular annulus 41, in the contour of the safe body in front of and preferably overhanging the door jamb. The metal contained in the sharp angular corner of the annulus, thus produced, will take the peening effect and stretch, if such action is employed, thereby preventing the stretching effect from being communicated to the door jamb proper, and protecting the said jamb from mutilation produced by the impact of the sledge. It has been found from actual practice that this construction is entirely efficacious for prevention of stretching by the application of the peening process of the door jamb in the body of the safe. The door and the respective surfaces in the jamb are made as near a size to fit as is possible to so construct the pieces of this character in rough castings, the door is then placed within the jamb, and owing to the fact that the projecting lugs from the door are thinner than the spaces in the door jamb, removable segmental plates being removed, the door may be rotated, or oscillated, after being supplied with a sufficient quantity of abrasive material such as emery, and all of the coacting surfaces of the door and the jamb may be thus gradually ground in, in this manner to a perfect fit. After the surfaces of the door and door-jamb have been ground to fit, as heretofore described, the segmental pieces 38, of machine or tool steel, are applied to the respective segmental projections of the door; the door is then put on a lathe and after careful measurements have been made the segments are turned off until the thickness of the lugs, including the segmental pieces, are just equal to the space between the surface 20 and the under sides of the lugs of the door jamb. The juxtaposition of the respective lugs upon the door and the jamb, when the lugs of the door are turned and are snugly secured under the lugs of the jamb, serves to hold the door firmly in its place, and is the means which maintains all of the respective surfaces in intimate contact. The bolts of the lock serve

only as a means for preventing the door from being rotated preliminarily to removing it from the door jamb.

While I have illustrated a single embodiment of my invention, it is apparent that variation may be made in the details thereof without departing from the spirit and scope thereof.

Having thus described my invention, what I claim and desire to secure by Letters Patent, of the United States, is:

1. In a safe, a part of relatively refractory metal having openings therein, inserts of toolable metal within said perforations, said inserts being provided with radial and axial grooves upon their outer surfaces, and locking means for said inserts located within said grooves engaging the walls of said perforations whereby to securely retain said inserts in position, substantially as described.

2. In a safe cast of a single piece, having an inwardly-extending door jamb provided with lugs, and an annular strengthening ring located at the inner limits of the jamb and projecting radially into the door opening, in combination with a door provided with securing lugs around its periphery coacting with the lugs on the jamb and having a continuous annular surface of smaller diameter than that portion of the door between said lugs, said annular surface coacting with the confronting surface of said strengthening ring to provide a broken, gas tight joint, substantially as described.

3. In a safe, the combination with a door having its front face in a substantially straight plane, of a casting providing an interior door jamb for receiving said door in tight fit, a straight ledge in alinement with the front face of the door when the latter is positioned in the jamb, and a portion, 41, extending radially inwardly at an angle to said straight portion to overlie the said straight portion as described.

4. In a safe, the combination with a door having its front face in a substantially straight plane, of a casting providing an interior door jamb for receiving said door in tight fit, a straight ledge in alinement with the front face of the door when the latter is positioned in the jamb, and a portion, 41, extending radially inwardly at an angle to said straight portion to overlie the said straight portion as described, and a rim on the front face of the door in alinement with the outer plane of the portion 41.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

WESLEY G. NICHOLS.

In the presence of—
JNO. B. GOODE,
WILLIAM CONOVER.