L. Lillie,

Molding Metal Safes.

No. 51,125. Patented Nov. 21, 1865.

Fig. 2.

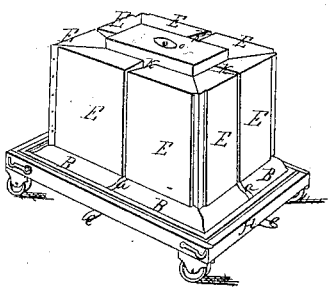


Fig. 3.

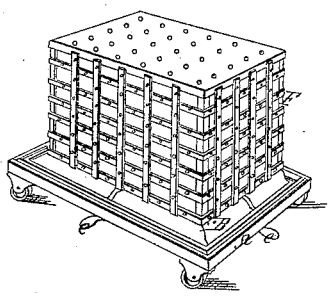


Fig. 1.

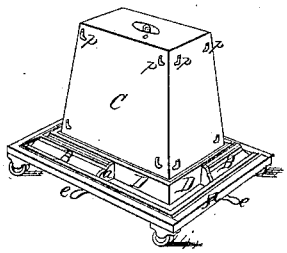


Fig. 4.

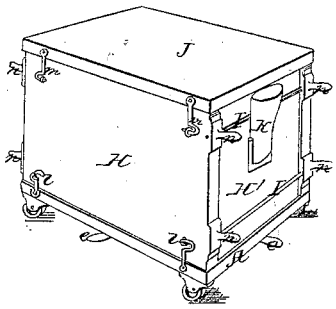


Fig. 5.

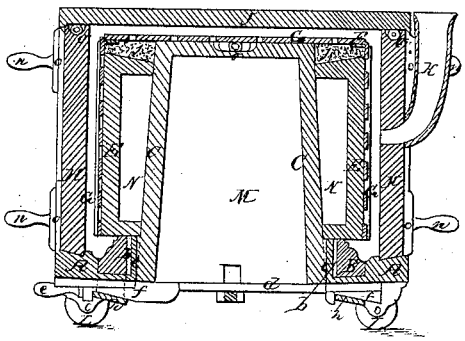
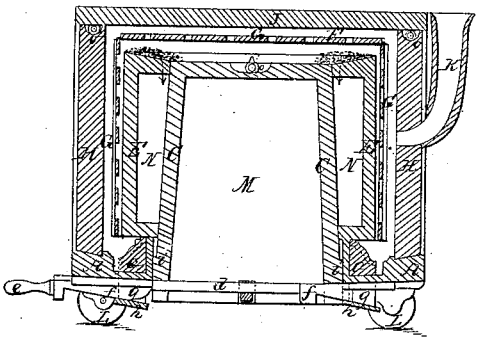


Fig. 6.



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IMPROVEMENT IN MOLDS FOR CASTING METAL SAFES, VAULTS, AND SIMILAR STRUCTURES.

Specification forming part of Letters Patent No. **51,125**, dated November 21, 1865.

To all whom it may concern:

Be it known that I, LEWIS LILLIE, of the city of Troy, county of Rensselaer, and State of New York, have invented certain new and useful improvements which I denominate "Improved Mold for Casting Metal Safes, Vaults, Doors, and Other Metallic Structures;" and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of my said invention and improvements, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which said drawings make a part of this specification.

Like letters represent and refer to like or corresponding parts.

Figure 1 is a perspective view, showing the base on wheels with mold for molding, and the pyramidical device or central core for receiving, holding, and guiding the core, made in sections, against which the inside part of the safe or vault is cast, and which form the inside portion of the safe, vault, or box, in the manner substantially as hereinafter described and set forth. Fig. 2 shows the same device found at Fig. 1, with the inner mold or core in sections, by which the inside part or portion of the safe, vault, or box is formed or cast, in the manner substantially as herein described and set forth. Fig. 3 contains the same devices as shown at Figs. 1 and 2, and shows the frame, made of wrought-iron bars or of boiler-plate iron, to be cast upon or surrounded by molten cast-iron or semi-steel, in the manner substantially as described and set forth in Letters Patent granted to me upon burglar and fire proof safes, &c., on the 15th day of July, 1851, extended or renewed for a term of seven years from July 15, 1865, and subsequently reissued. The said Fig. 3 shows the frame of wrought-iron bars upon the inner mold or core in condition to receive the molten cast-iron or semi-steel, &c. Fig. 4 shows the mold for casting my said burglar and fire proof safes or vaults complete and ready for use. Fig. 5 is a vertical section through the center lengthwise, and showing the different devices herein described and set forth, and each and all ready and in condition to receive the molten iron or semi-steel by which the safe or vault is made. Fig. 6 is also a longitudinal vertical section, containing the same parts or devices shown at Fig. 5, but shows the inner device or central core seen at Fig. 1 in a dropped or lower condition than shown at Fig. 5, so as to allow the core or inner sectional mold shown at Fig. 2 to contract to conform to the shrinking or contraction of the metal during the operation of the cooling of the same, in the manner substantially as hereinafter described and set forth.

Heretofore in the manufacture of my said patented burglar and fire proof safes, vaults, and doors, I have formed the molds for casting the same by means of patterns, flasks, sand, &c., in the usual way for making castings, which has always been expensive in time, labor, &c., and requiring one such mold to each safe, vault, or door so cast.

By the use of my said invention and improvements it will be seen that no separate patterns of iron or of wood are required to give form or shape to my said safe, vault, or door, &c., as the mold for the same is all perfect and complete when the pyramidical center with its surrounding inner mold or core and the outer molds are put together and correctly adjusted, in the manner substantially as hereinafter described and set forth.

It is manifest that a great many safes, vaults, doors, &c., as the case may be, may be continuously cast or made in such mold, constructed, arranged, and operated in the manner substantially as herein described and set forth, by means of which I am enabled to make much better burglar and fire proof safes, vaults, doors, &c., with greater rapidity and at a greatly reduced expense in labor and material, than by any other plan or known device for casting such safes, vaults, doors, or plates, &c., with plain or irregular surfaces. By placing such mold upon properly constructed and arranged wheels, and the same upon a track of iron laid or put down for that purpose, each such mold is moved to the cupola or furnace containing the molten metal, and is then filled and then moved to some proper place for cooling, whereby the expense of machinery to move them with and of laborers to manage them is dispensed with, thereby greatly economizing in time and in labor in such manufacture, in the manner substantially as herein described and set forth.

The nature of my said invention and improvements consists in the employment of a mold for casting burglar and fire proof safes, vaults, and similar structures, containing a pyr-

amidical center surrounded by molds or cores of cast-iron, or an equivalent, for forming the inside thereof, in the manner substantially as hereinafter described and set forth.

It also consists in so arranging the inner mold or core which forms the inner part of such safe or vault so that the same when thus formed by the molten iron or semi or other steel may be allowed to shrink or contract by cooling without breaking the same or other injury thereto, and then thereafter be used for the making or casting of other such safes, vaults, &c., after the removal from such mold of the safe, vault, &c., so cast and cooled ready for finish for use.

It also consists in the employment of a mold to form the front molding around the door or other part of my said safe, vault, or other structure which shall be permitted to contract as the metal contracts upon cooling, and thus prevent injury to the same by being broken or otherwise during the operation of such cooling.

It also consists in the employment of means by which the mold which forms the molding upon the front of safe, vault, door, or other structure is divided and separated in one or more places upon each side thereof for the purpose of allowing the same to contract while cooling, and thereby prevent the same from being broken during the operation of cooling, in the manner substantially as herein described and set forth.

It also consists in the employment of means by which the said central or pyramidical core is caused to drop sufficiently to allow the inner molds or cores surrounding the same to contract as the metal cools, and thereby prevent any breaking or other injury to such safe, vault, or other structure during the operation of cooling, in the manner substantially as herein described and set forth.

Having thus described the nature of my said invention and improvements, I will here proceed to describe the construction and operation thereof, in order to enable those skilled in the art to which it relates to make and put the same into use, which is as follows, to wit:

A in each and every figure of the said drawings is the base or foundation plate, which is made of iron, and placed upon small wheels, with one at each corner thereof; or there may be six such wheels, if found necessary. The upper part of the said foundation-plate is so constructed and arranged as to receive and hold the mold B, Figs. 1, 2, 3, 5, and 6, by which the molding upon the front and surrounding the door of my said safes and vaults is cast and formed. Any design of molding may be used. The said molding-mold B forming the front and door-jamb of my said safe or vault is made in quarters, less the thickness of the key or wedge *a*, Figs. 1, 2, and 3, which key or wedge is so constructed and arranged as to be drawn down from the face of said molding-mold B in such manner as to permit the said mold B to be moved or drawn inward toward the pyramidical center core, C, Figs. 1, 2, 5, and 6, by means of the contraction of the cast-iron molding on the said safe or vault during the operation of the cooling of the same. It will therefore contract by cooling upon said mold B without breaking or other injury, and the said mold will yield or contract in the same proportion as the said cast-iron cast thereon will contract or shrink by cooling, and the same form of molding as that contained upon said mold B will be retained during the entire operation of cooling and shrinking as aforesaid. The said mold B is placed in and operates in a channel or recess in the base or platform A, a sectional part of which is shown at D, Fig. 1. When the said mold B is correctly adjusted to its required place for the purpose of receiving the cast-iron which is to form the aforesaid molding upon the front and around the door of my safe or vault as aforesaid, there will be a space, *b*, between such mold B and the perpendicular stationary plate C, Fig. 5. The said unoccupied space *b*, Fig. 5, is for the purpose of allowing the contraction of the said mold B in the manner substantially as aforesaid. The said mold B is put in its proper place or condition so as to form the said molding upon my said safe or vault by means of the said keys or wedged-shaped pieces *a*, the upper end of which is formed in shape to correspond to and with the molding upon the said mold B, and when so adjusted the mold will be completed upon the four sides and ready to receive the molten iron which is to form the front part of my said safe or vault.

The vertical and stationary piece C, Figs. 5 and 6, entirely surrounds the said pyramidical central core, C, and is of height to correspond to the said mold B, as seen at Figs. 5 and 6. Within the said vertical and fixed pieces C I construct and arrange the said central core, C, Figs. 1, 2, 5, and 6, which is made of iron and in a tapering or pyramidical shape. It is made in size to correspond to inner part or space of the safe or vault to be constructed, adding thereto said outer core E. It is made hollow, so as to make it of as little weight as possible, and it has a tapering or pyramidical form, as shown in said drawings, so that when it becomes necessary to let the same drop down in the manner hereinafter described it shall become free from or in a manner separated from the sectional inner mold or core, E, Figs. 1, 2, 5, and 6, and thereby form sufficient space to permit the said mold or core E to move inward by means of the contraction or shrinking of the entire safe or vault cast upon and around the same in the manner substantially as herein described and set forth. The said central pyramidical core, C, rests at its lower and larger end upon the cross-bars *d*, Figs. 5 and 6, which cross-bars have a horizontal and wedge-shaped key at or near each end thereof, so constructed, arranged, and combined with the said vertical and wedged-shaped key *a* as to move and operate the same by means of the handles

e, shown in the several figures of said drawings. When the said horizontal bars containing such keys or slides are pushed inward, as shown at Fig. 5, then the said central core, C, will be supported in the required position to receive the molds or core E, for the operation of casting upon and around, while at the same time and operation the said vertical wedges *a* are forced upward, thereby correctly placing or adjusting the said mold B to receive the molten iron to form the front part of my said safe or vault. When the said horizontal bars containing such wedged-shape keys or slides are drawn out from the said central mold, C, as shown at Fig. 6, then the said central pyramidical core, C, will drop downward, as appears at said Fig. 6, which, when done, the inner mold or core E surrounding the same will be provided with room or space sufficient to permit of the shrinkage or contraction of said safe or vault by cooling in the manner aforesaid. There are two cross-bars, *d*, which contain such horizontal wedged-shaped keys or slides, which cross each other at right angles from end to end and from side to side. The said wedged-shaped keys or slides may be seen at *f*, Figs. 5 and 6. The recess or device in which the said keys or slides *f* operate, and by which the said horizontal bars *a*, same figure, are directed in raising or lowering the said central core, C, as aforesaid, may be seen at *g*, Fig. 6. The said keys or slides are correctly held each in their adjusted position by means of the plate *h*, Figs. 5 and 6, which plate is held to the lower part of the vertical keys or wedged-shaped pieces *a*, Figs. 1, 2, and 3, by means of screws, which may also be seen in dotted lines at *a*, Fig. 6. There are four such keys or wedged-shaped pieces, one upon each side of the said pyramidical or central core, C, and they may be made of any size deemed best. The upper end of the same will always contain the same shaped molding or form as that upon the upper surface of the said mold B, while the lower end thereof will be made so as to conform to the shape or form of the said horizontal key or piece *f*, as shown at Fig. 6. By means of the said horizontal bar *d*, two of the said keys or pieces *a* are operated at the same time and in the same manner, substantially as shown at said Figs. 5 and 6. When both bars *d* are drawn out or operated so as to draw or move downward the said vertical keys or pieces *a*, so as to permit of the contraction of the surrounding mold B, as aforesaid, then the said pyramidical or central core, C, will drop down a short distance, as shown at Fig. 6, and will thereby permit the movement or contraction of the said surrounding mold or core E toward the said central core, C, as hereinbefore described and set forth. The said central or pyramidical core, C, moves vertically down or up, as the case may require, by means of the guides *i* upon each corner of said central core, Fig. 6.

j, Fig. 5, represents sand upon the top of the surrounding molds or core E and against the immediate upper part of the said central core, C. The entire space so to be filled with sand may be seen at Fig. 2. I use sand in saids pace *j* for the purpose of making the upper part of the said inner mold or core of smooth and even surface, so as to receive the molten iron and retain the same in the required manner or position, as well as to prevent the said molten iron from running in between the said surrounding molds E and the said central core, C. The most important use of the said sand *j*, which entirely surrounds the said central core, is to permit the shrinkage or contraction of the safe or vault from front to back, and after dropping the central core, C, will yield to or be forced by the contracting metal into vacant spaces and openings around the central core, C. The molds E not being permitted to drop downward, or in any other manner to become somewhat shortened so as to conform to the shrinkage or contraction of the iron by which the safe or vault is made, it is found more economical to use sand for that purpose, which will yield or be forced out upon the said central core, C, sufficiently to permit of contraction by cooling, as aforesaid, and thereby prevent the breaking of such safe or vault while cooling in the general mold wherein such safe or vault is cast. *k k k k*, Fig. 2, are spaces between the edges of the said surrounding molds or core E and the sides of the said pyramidical or central core, C, and are of any convenient size or shape to receive sand and thus complete the inner mold or core, on and around which the inner part of said safe or vault is formed or cast. I usually make the said spaces much larger upon that part of said molds E which adjoins the sides of said central core, C. I thus use sand for the purpose of permitting each and every of said surrounding molds or cores E to move in toward said central core, C, by means of the shrinkage or contraction of the safe or vault by the cooling of the iron when the said central core shall have been dropped in the manner substantially as aforesaid. The said sand filling the said spaces *k* will, when the said core C shall have been dropped as aforesaid, be forced inward and partially from such spaces by the cooling, and thereby the contraction of such safe or vault.

F, Figs. 3, 5, and 6, shows the wrought-iron frame, made of bars or boiler-plate iron, substantially as appears at Fig. 3, upon and around which I pour the cast-iron or semi-steel or cast-steel in the manner substantially as and for the purposes described and set forth in the reissue of my Letters Patent upon burglar and fire proof safes, vaults, doors, &c., and which patent bears date July 15th, 1851, and which was renewed or extended for a new term of seven years on or about the 15th day of July, 1865, and which said wrought-iron frame need not here be more particularly described or set forth. This frame F is placed upon and around the said inner mold or core, constructed sub-

stantially as aforesaid and when the same is adjusted so as to receive the molten iron.

G, Figs. 5 and 6, is the space to receive the molten cast-iron by which said safe or vault is formed as aforesaid, and it represents the thickness of such cast-iron.

H is the outer surrounding frame or mold, which firmly rests upon the upper surface of the said platform A, and is there securely held by means of the hooks or latches *e*, Fig. 4, upon each side thereof. The end piece H′, Fig. 4, is firmly held to the respective sides H by means of rods or bolts with nut and screw I, there being two or more at each end thereof.

J, Figs. 4, 5, and 6, is the top plate, which closely fits upon the upper edge of the surrounding sides or mold-pieces H, and is there securely held by means of hooks *m m*, Fig. 4, upon each side thereof. The mold for casting said safe or vault is thus completed without the aid of safe or vault patterns or flask.

K, Figs. 4, 5, and 6, is the tube or conductor by which and through which the molten metal is conducted to and into the said safe or vault mold, so constructed as aforesaid.

L, Figs. 5 and 6, are wheels, which support and move the entire safe or vault mold aforesaid to any desired place upon any track constructed suitable for that purpose.

n, Figs. 4 and 5, are handles by which the side molds, 4, may be handled in the putting together and taking apart the said safe or vault mold aforesaid.

o, Figs. 1, 2, 5, and 6, are rings or places to receive a hook or iron from a crane, so as to lift and remove such parts of the said general mold which may contain the same.

Each and every part of my said safe, vault, or door mold aforesaid is made of cast-iron, semi or cast steel, or wrought-iron, and at any thickness or size to answer the required purpose.

M and N, Figs. 5 and 6, represent hollow spaces in said molds C and E. *p p*, Fig. 1, are hook-pins, for the surpose of receiving and holding the said molds or cores E upon and firmly against the said pyramidical or central core C, during the operation of the making up of the inner mold which forms the inside of the said safe or vault as aforesaid, and during the operation of casting or pouring the molten metal. When the said central core drops down as aforesaid the said hook-pins *p* will become disengaged from said molds E suspended thereto thereby. When the molten material which has been poured so as to form the said safe or vault as aforesaid shall have set or become somewhat cool within said mold, I then operate the said horizontal bars *a* with aforesaid wedged-shaped keys or slides, which lets down the said central core C as aforesaid, and then and thereby the said safe or vault thus cast will have sufficient room or space for contraction or shrinkage in all directions during the operation of cooling as aforesaid.

For every size of safe or vault there will be required a distinct mold to correspond thereto, and the same may be used for casting many hundreds of such safes or vaults of such size.

The same general principle herein described for forming molds for the manufacture of safes and vaults so as to permit of contraction by cooling without injury, it is manifest, may be applied to casting of doors, plates, and articles made of cast-iron, semi or cast steel, in the manufacture of the same.

By thus making the molds of iron it will be seen that I am enabled to chill the cast-iron which forms my said safe or vault upon the immediate inside and upon the immediate outside thereof by means of its coming in contact with the surfaces of the aforesaid iron molds. It will also become chilled by means of the said wrought-iron frame.

The principle hereinbefore described may be applied to the casting of stove-plates which have irregular surfaces.

Having thus described the nature, construction and operation of my said invention and improvements, what I claim, and desire to secure by Letters Patent of the United States of America, is—

1. The employment and combination of the pyramidical or central core, C, with the surrounding molds E, each constructed and arranged in the manner substantially as and for the purposes herein described and set forth.

2. The arrangement of the means herein described, or any equivalents therefor, by means of which the said pyramidical or central core is permitted to drop, in the manner and for the purposes substantially as herein described and set forth.

3. The employment of the surrounding mold B and E, in combination with the vertical wedged-shaped keys *a*, or any equivalents therefor, arranged and operated in the manner substantially as and for the purposes herein described and set forth.

4. The combination of the horizontal wedged-shaped keys or slides *f* with the vertical wedges or keys *a*, each being arranged and operated in the manner and for the purposes substantially as herein described and set forth.

5. The mode herein described for making safes and vaults of wrought and cast iron or semi or cast steel in iron or metallic molds, substantially as herein described and set forth.

In testimony whereof I have, on this 16th day of September, hereunto set my hand.

LEWIS LILLIE.

Witnesses:

CHARLES. D. KELLUM,

MARCUS P. NORTON.