

C. K. ERNST.
TRAP DOOR.

APPLICATION FILED MAY 23, 1910.

Patented May 6, 1913.

2 SHEETS-SHEET 1.

1,060,974.

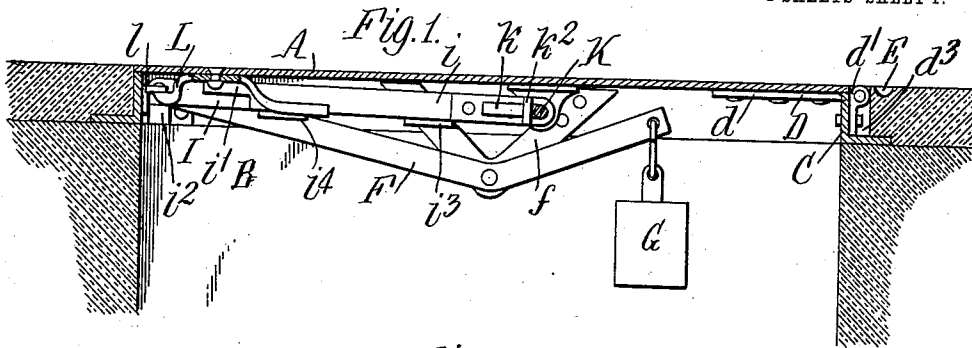
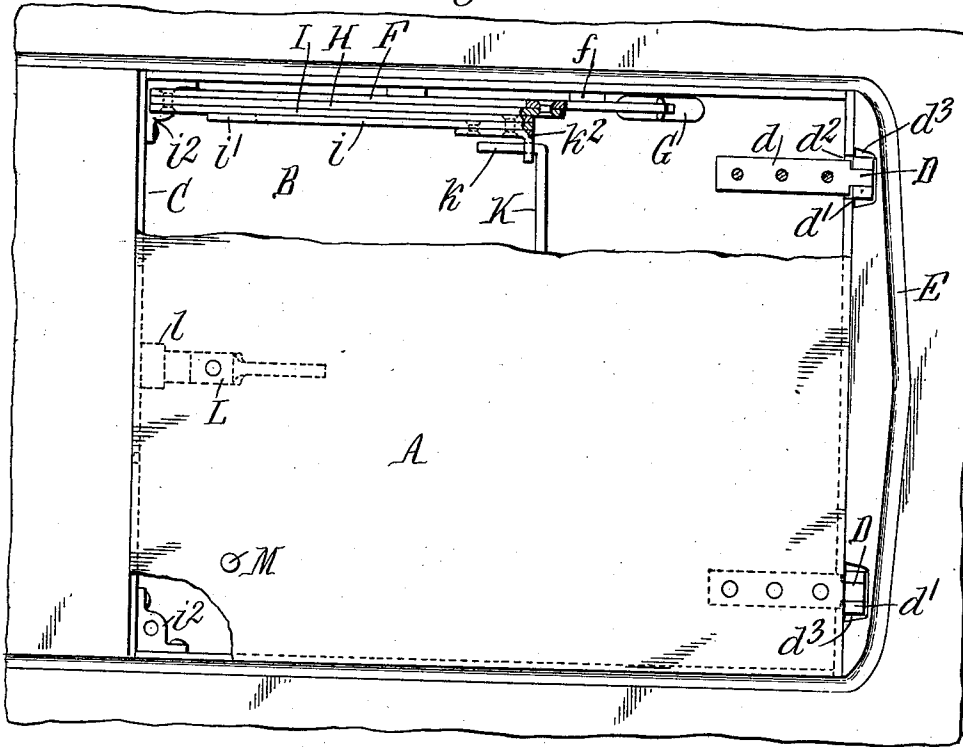


Fig. 2.



Witnesses.
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2 SHEETS—SHEET 2.

Fig. 3.

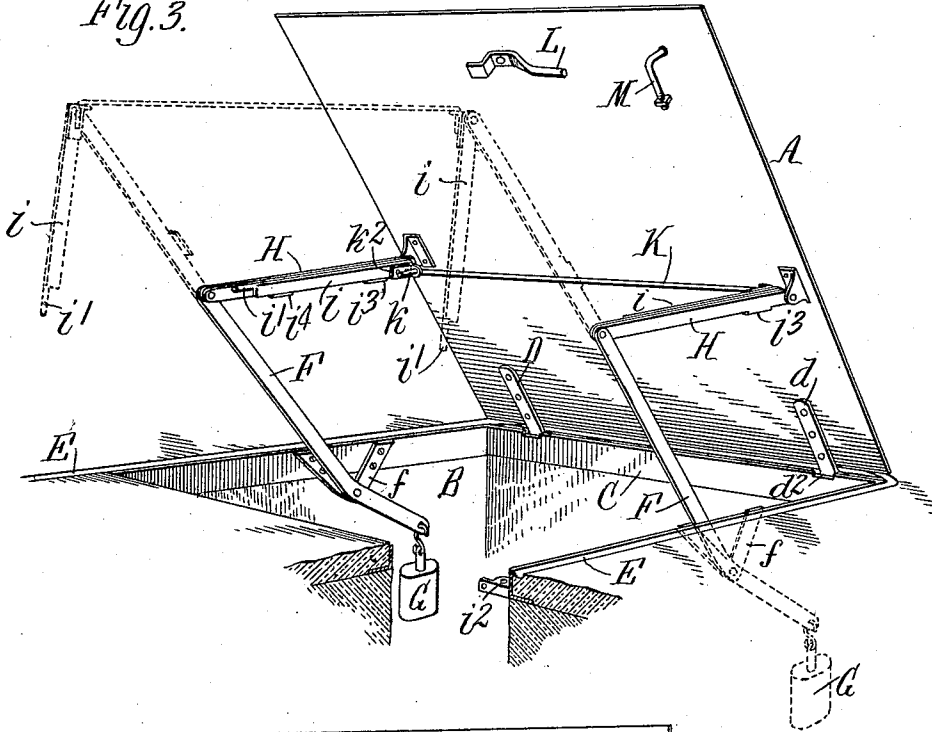
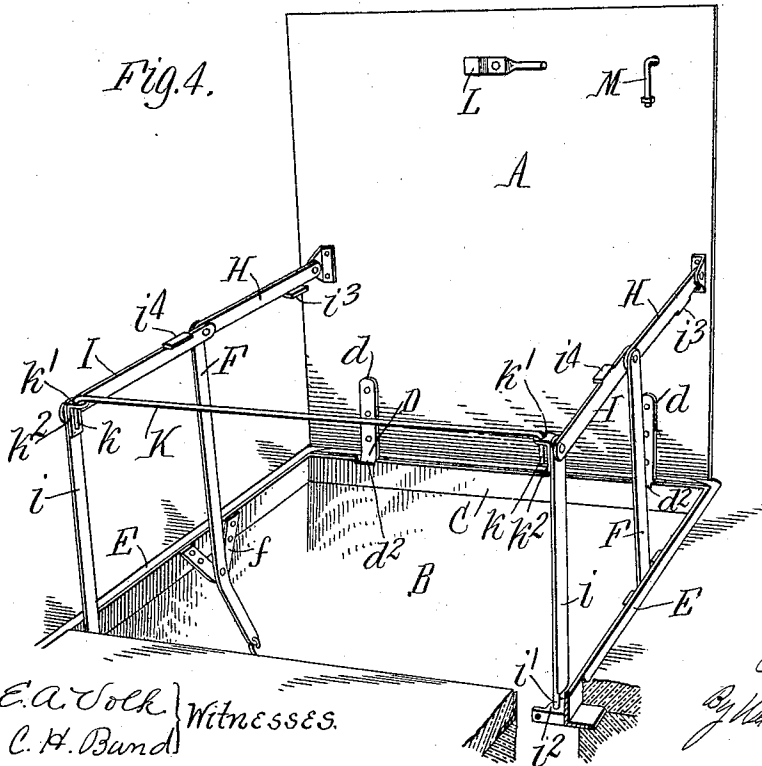


Fig. 4.



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C. H. Band } WITNESSES.

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UNITED STATES PATENT OFFICE.

CHARLES K. ERNST, OF BUFFALO, NEW YORK.

TRAP-DOOR.

1,060,974.

Specification of Letters Patent.

Patented May 6, 1913.

Application filed May 23, 1910. Serial No. 562,800.

To all whom it may concern:

Be it known that I, CHARLES K. ERNST, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Trap-Doors, of which the following is a specification.

This invention relates to improvements in trap doors which are intended to be used for covering openings in pavements, walks, floors and the like, and which are hinged at one end and open upwardly to give access to the opening.

The objects of this invention are to provide a trap door of this type of simple and inexpensive construction and neat appearance which can be easily opened and closed and will be retained in its open position when moved thereto; which, when closed, will form a secure and closely fitting covering for the opening so as to prevent water from entering the same and will lie flush with the upper surface of the walk or floor in which it is secured and have no edges or parts projecting above such surface; and which is provided with suitable folding arms or guard members which, when the door is open, can be extended to surround the opening and form a guard therefor so as to prevent any one from inadvertently stepping into the opening.

In the accompanying drawings, consisting of two sheets: Figure 1 is a fragmentary sectional elevation of a trap door and adjacent parts embodying the invention, showing the door in its closed position in the walk or pavement. Fig. 2 is a fragmentary plan view thereof, portions of the door being broken away to show the underlying parts. Fig. 3 is a perspective view, partly in section, of the door when partially open. Fig. 4 is a similar view of the door in its open position.

Like reference characters refer to like parts in the several figures.

A represents the trap door, B the opening in the pavement or floor which it is intended to cover, and C a frame surrounding this opening upon which the door rests and to which it is hinged. The door and opening correspond in shape, which, in the construction shown, is rectangular, and the door is preferably formed from a single piece of sheet metal, as shown. The frame C may be of any suitable construction. That shown consists of side and end sections of

angle-iron suitably secured together and so arranged that one flange of each section is embedded in the wall surrounding the opening, while the other flange extends upwardly therefrom adjacent to the wall. The door A is adapted to rest upon and overlap the top edges of these upright flanges of the frame and is hinged at one end to the corresponding end of the frame by suitable hinges D, one member d of each hinge being riveted or otherwise suitably secured to the under side of the door, while the other member d' is similarly secured to the upright flange of the frame on the outer side thereof. The upper edge of the upright flange to which the hinge members d' are secured is cut away at d^2 d^2 to receive the hinge members d when the door is closed, so that the door will rest directly on the upper edges of the frame. The frame C is set in the pavement with its upper edge lying below the top surface thereof a distance equal to the thickness of the door so that the door, when closed, will be flush with the pavement. The hinge members d' are inclosed in pockets d^3 in the pavement and are arranged on the frame so that the hinge joints will not project above the upper surface of the pavement. The door and its hinges thus have no parts projecting above the surface of the pavement which would tend to interfere with the free and unobstructed use thereof.

The door overlaps the supporting edges of the frame and at its upper and lower ends abuts against the adjacent edges of the pavement, thus forming a tight joint for the ends of the door to prevent any water from finding its way through the same into the opening. Along each side of the door and at its upper end, the pavement is provided with a suitably inclined gutter E which is adapted to carry away any surplus of water on the pavement about the door and prevent the accumulation thereof adjacent to the joints between the door and its frame. This makes it practically impossible for any water to obtain access to the opening beneath the door and the door thus forms a substantially water-tight closure for the opening.

To enable the door to be raised with ease and to be normally retained in its upright open position, the following construction is employed. F F represent levers which are pivotally secured intermediate of their ends

to the opposite sides of the frame C. These levers, in the construction shown, are pivoted to brackets *f* *f* which are riveted or otherwise secured to the frame and depend therefrom so as to bring the points of pivotal connection for the levers below the lower edge of the frame and thus permit levers with longer upper arms to be used. If desired, however, the levers may be pivoted directly to the frame. At its lower end, each lever is provided with a suitable weight G, and at its upper end is pivotally connected by a link or arm H with the inner side of the door. The weight G serves to counterbalance the weight of the door so that the latter can be easily raised to its upright position and will be normally held by the action of the weight in this position. The arrangement of the counterbalancing levers at each side of the frame leaves the opening unobstructed when the door is open so that substantially the entire area of the opening is available for use in moving articles through the opening. The door is provided on its under side with extension guard arms I which are adapted to be folded out of the way when the door is closed, and when the door is open, can be unfolded and will cooperate with the links H to form guards for the sides of the opening. These arms are connected together at their outer ends by a detachable connecting rod K which is adapted to form a guard for the front of the opening when the arms are extended. These parts are preferably constructed as follows: The guard arms I are pivoted at one end to the outer ends of the links H preferably by the same pivots which secure the levers F and links H together, and each is provided at its opposite end with a folding post *i* which is pivoted thereto. The posts *i* have reduced ends *i'* which are adapted to engage in suitable sockets *i*² secured to the inner front side of the frame C adjacent to its opposite corners. The guard arms I and the posts *i* are adapted to fold together and be folded over so as to lie along side of and substantially parallel with the links H when not in use and for this purpose the links and guard arms are provided with laterally projecting lugs *i*³ and *i*⁴, respectively, which serve to support the guard arms and their posts in their folded position. The connecting rod K may be detachably secured at its ends to the arms I in any suitable manner. In the construction shown, the rod is provided with hooked ends *k* which are adapted to engage in eyes *k'* formed in laterally projecting lugs *k*² on the inner upper ends of the posts *i*. The rod K normally remains in connecting engagement with the guard arms in both their folded and extended positions. It may, however, be easily detached when desired to

give access to the front side of the opening. When the door is opened and stands in its upright position, the length of the upper arms of the levers F is such that the links H will extend in a substantially horizontal direction. The guard arms I can then be unfolded and the ends of the posts *i* inserted in the sockets *i*² in the frame. The posts will stand upright in these sockets and sustain the arms I and the connecting rod K in a substantially horizontal position above the pavement. The arms I will thus constitute extensions of the links H and form therewith guards for the sides of the opening, while the rod K will extend across and guard the front end thereof. The guard arms and connecting rod being secured to and carried by the links on the under side of the door, they are out of the way when not in use but are always accessible when the door is open so that when needed they can be easily unfolded and placed in position for guarding the opening.

L represents a hooked locking member which is pivoted to the under side of the door, and is adapted to be moved to engage a projecting lug or catch *l* on the frame when the door is closed, and M represents a handle of common construction which is loosely mounted in an opening in the frame and can be drawn through the same for opening the door.

I claim as my invention:

1. The combination with a tilting trap door, of means for holding the door open comprising levers mounted at opposite sides of the door opening, connections between the levers and door, guard members attached to the levers, and means for supporting the guard members in positions in which they form guards for the opposite sides of the door opening, substantially as set forth.

2. The combination with a tilting trap door, of means for holding the door open comprising levers mounted at opposite sides of the door opening and links connecting said levers to the door, guard members attached to the levers, and means for supporting the guard members in positions in which they cooperate with said links to form guards for the opposite sides of the door openings, substantially as set forth.

3. The combination with a tilting trap door, of means for holding said door open, comprising levers pivotally supported at opposite sides of the door opening, links connecting said levers with said door, said links occupying substantially horizontal positions when the door is open, guard members attached to the door holding means, and means for supporting said guard members in substantially horizontal positions in which they cooperate with said links to form guards for the opposite sides of the door opening, substantially as set forth.

4. The combination with a tilting trap door, of means for holding the door open comprising counterweighted levers pivotally mounted at opposite sides of the door opening, and links connecting the ends of said levers with said door, guard members attached to said door holding means, and means for supporting said guard members in positions in which they cooperate with said links to form guards for the opposite sides of the door opening, substantially as set forth.

5. The combination with a trap door hinged at one end, of movable supports arranged at opposite sides of the door opening for holding the door open, said supports being concealed beneath the door when closed, guard members movably secured to said supports, and means for supporting said guard members in positions to form guards for the opposite sides of the door opening, substantially as set forth.

6. The combination with a trap door hinged at one end, of movable supports arranged at opposite sides of the door opening for holding the door open, said supports being concealed beneath the door when closed, guard members pivoted to said supports and supported at their inner ends thereby, and supporting posts attached to the outer ends of said guard members and adapted to support said members in positions to form guards for the opposite sides of the door opening, substantially as set forth.

7. The combination with a tilting trap doors, of devices mounted on opposite sides of the door opening for holding said door open, guard members movably secured to said devices, means for supporting said guard members in positions to form guards for the ends of said door opening, and a guard bar connecting said guard members and forming a guard for the front of said door opening, substantially as set forth.

8. The combination with a tilting trap door, of counterweighted levers pivoted at opposite sides of the door opening, links pivotally connected to the upper ends of said levers and to said door, guard members hinged to said levers, and means for supporting said guard members in a substantially horizontal position above the sides of said door opening, substantially as set forth.

9. The combination with a tilting trap door, of separate counterweighted levers pivoted at the opposite sides of the door opening and adapted to project above the same when the door is open, links pivotally connected with the upper ends of said levers and with the opposite sides of the door, whereby the door opening is left substantially unobstructed, said links occupying substantially horizontal positions above the sides of said door opening when the door is open, guard members hinged to the upper ends of said

levers, and means for supporting said guard members in substantially horizontal positions above the sides of said door opening, said links and guard members cooperating to form guards for the opposite sides of said door opening, substantially as set forth.

10. The combination of a trap door hinged at one end and adapted to fold into a substantially horizontal position when closed, levers pivoted at opposite sides of the door opening and adapted to project up through the opening when the door is open, and links pivoted to the upper ends of said levers, the ends of said links being pivoted to the door at points removed from the hinge thereof, whereby when the door is open the links will extend along the sides of the door opening, above the same, and form guards for the opening, said links and levers folding beneath the door when closed, substantially as set forth.

11. The combination of a trap door hinged at one end, levers pivoted at opposite sides of the door opening and adapted to project up through the opening when the door is open, and links pivoted to the upper ends of said levers, the ends of said links being pivoted to the door at points removed from the hinge thereof, whereby when the door is open the links will extend along the sides of the door opening, above the same, and form guards for the opening, and guard members attached to said levers for completing the guard around said opening, substantially as set forth.

12. The combination with a trap door hinged at one end, of levers pivoted at the sides of the door opening and adapted to project up through said opening when the door is open, and links pivoted at one end to the ends of said levers and at the other end to said door at points removed from the hinges of said door a distance approximately equal to the length of the projecting portions of the levers whereby when the door is open the links will be supported in substantially horizontal position above the sides of the door opening and will form guards for such opening, substantially as set forth.

13. The combination with a trap door hinged at one end, of levers pivoted at the sides of the door opening and adapted to project up through said opening when the door is open, links pivoted at one end to the ends of said levers and at the other end to said door at points removed from the hinges of said door a distance approximately equal to the length of the projecting portions of the levers whereby when the door is open the links will be supported in substantially horizontal position above the sides of the door opening and will form guards for such opening, guard members carried by said levers, and means for supporting said guard members in extended alinement with said

links when the door is open, substantially as set forth.

14. The combination with a trap door hinged at one end, of levers pivoted at the sides of the door opening and adapted to project up through said opening when the door is open, links pivoted at one end to said levers and at the other end to said door, guard bars pivotally connected to said levers and adapted to fold into positions parallel with said links when the door is closed, and means for supporting said guard bars in extended alinement with said links when the door is open, substantially as set forth.

15. The combination with a trap door hinged at one end, of levers pivoted at the sides of the door opening and adapted to project up through said opening when the door is open, links pivoted at one end to said levers and at the other end to said door, guard bars pivotally connected to said levers and capable of being folded into positions parallel with said links when the door is closed, and means for supporting said guard bars in extended alinement with said links when the door is open, comprising posts pivoted to the free ends of said guard bars, said posts being capable of being folded into positions parallel with said guard bars and links when the door is closed, substantially as set forth.

16. The combination with a trap door hinged at one end, of levers pivoted at the sides of the door opening and adapted to project up through said opening when the door is open, links pivoted at one end to said levers and at the other end to said door, guard bars pivotally connected to said levers and capable of being folded into positions parallel with said links when the door is closed, means for supporting said guard bars in extended alinement with said links when the door is open comprising posts pivoted to the free ends of said guard bars, said posts being capable of being folded into positions parallel with said guard bars and links when the door is closed, and a cross guard bar connecting the free ends of said pivoted guard bars, substantially as set forth.

17. The combination with a trap door hinged at one end, of levers pivoted at the sides of the door opening and adapted to project up through said opening when the door is open, links pivoted at one end to said

levers and at the other end to said door, guard bars pivotally connected to said levers and capable of being folded into positions parallel with said links when the door is closed, means for supporting said guard bars in extended alinement with said links when the door is open, comprising posts pivoted to the free ends of said guard bars, said posts being capable of being folded into positions parallel with said guard bars and links when the door is closed, said links having flanges thereon adapted to support said guard bars in folded position, said guard bars having flanges thereon adapted to support said posts in folded position, substantially as set forth.

18. The combination with a trap door, of a frame surrounding the opening which the door is intended to cover, said door being hinged at one end to said frame, brackets secured to said frame at each side thereof and projecting down along the sides of said opening, levers pivoted to the lower ends of said brackets, each of said levers having a counterweight on one arm thereof, the other arms of said levers projecting up through said opening when the door is open, and links pivoted at one end to the projecting ends of said levers and at the other end to the door at points removed from the hinges thereof, substantially as set forth.

19. The combination with a trap door, of a frame surrounding the opening which the door is intended to cover, said door being hinged at one end to said frame, brackets secured to said frame at each side thereof and projecting down along the sides of said opening, levers pivoted to the lower ends of said brackets, each of said levers having a counterweight on one arm thereof, the other arms of said levers projecting up through said opening when the door is open, and links pivoted at one end to the projecting ends of said levers and at the other end to the door at points removed from the hinges thereof, the arms of said levers which carry the counterweights being bent at angles to the other arms of said levers in the direction of said door, substantially as set forth.

Witness my hand, this 18th day of May, 1910.

CHARLES K. ERNST.

Witnesses:

EDWARD C. HARD,
C. B. HORNBECK.