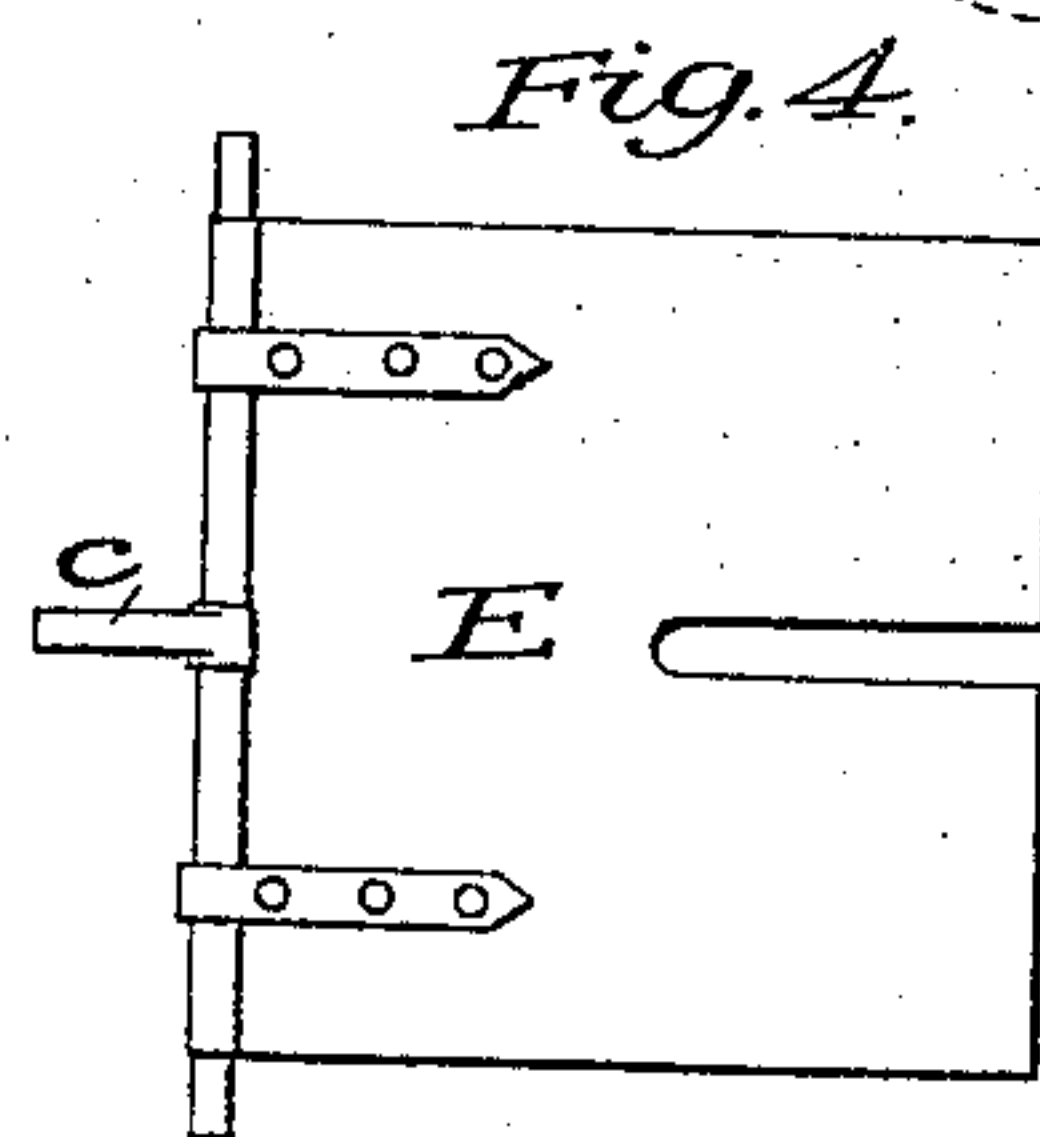
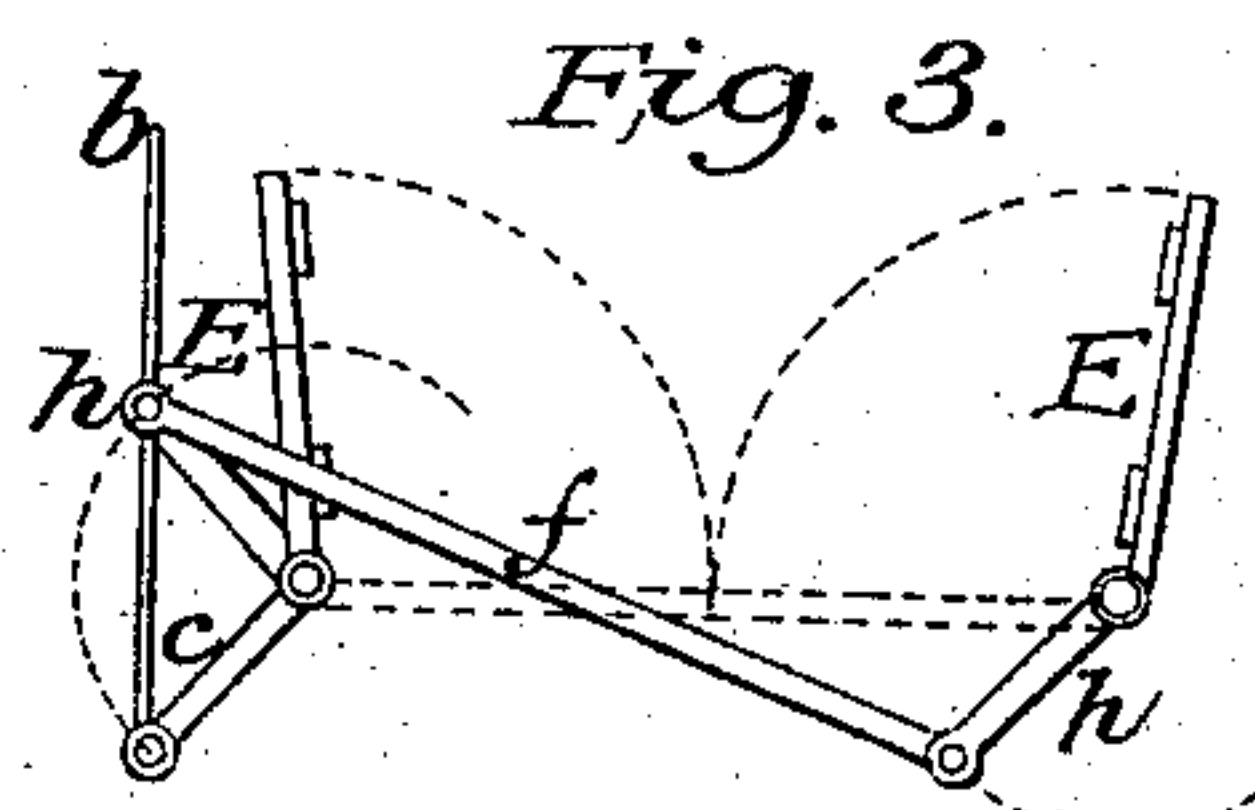
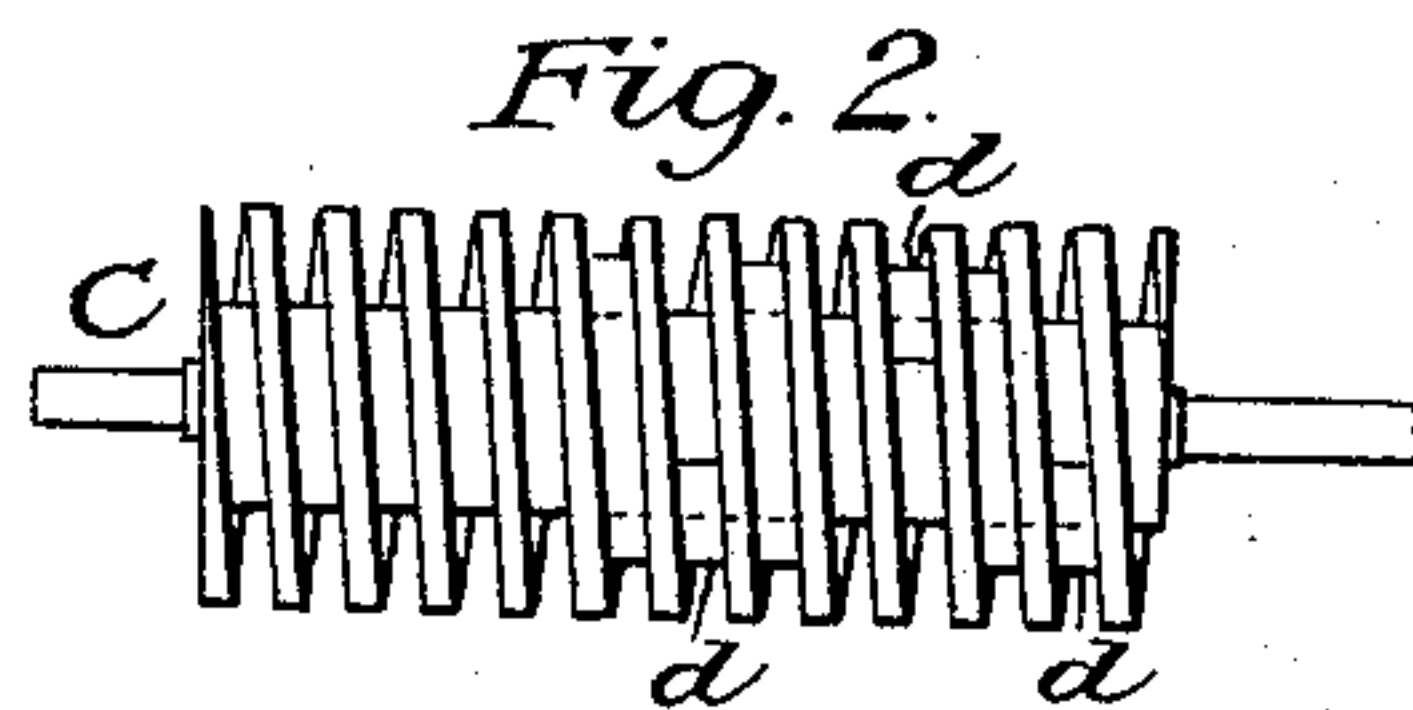
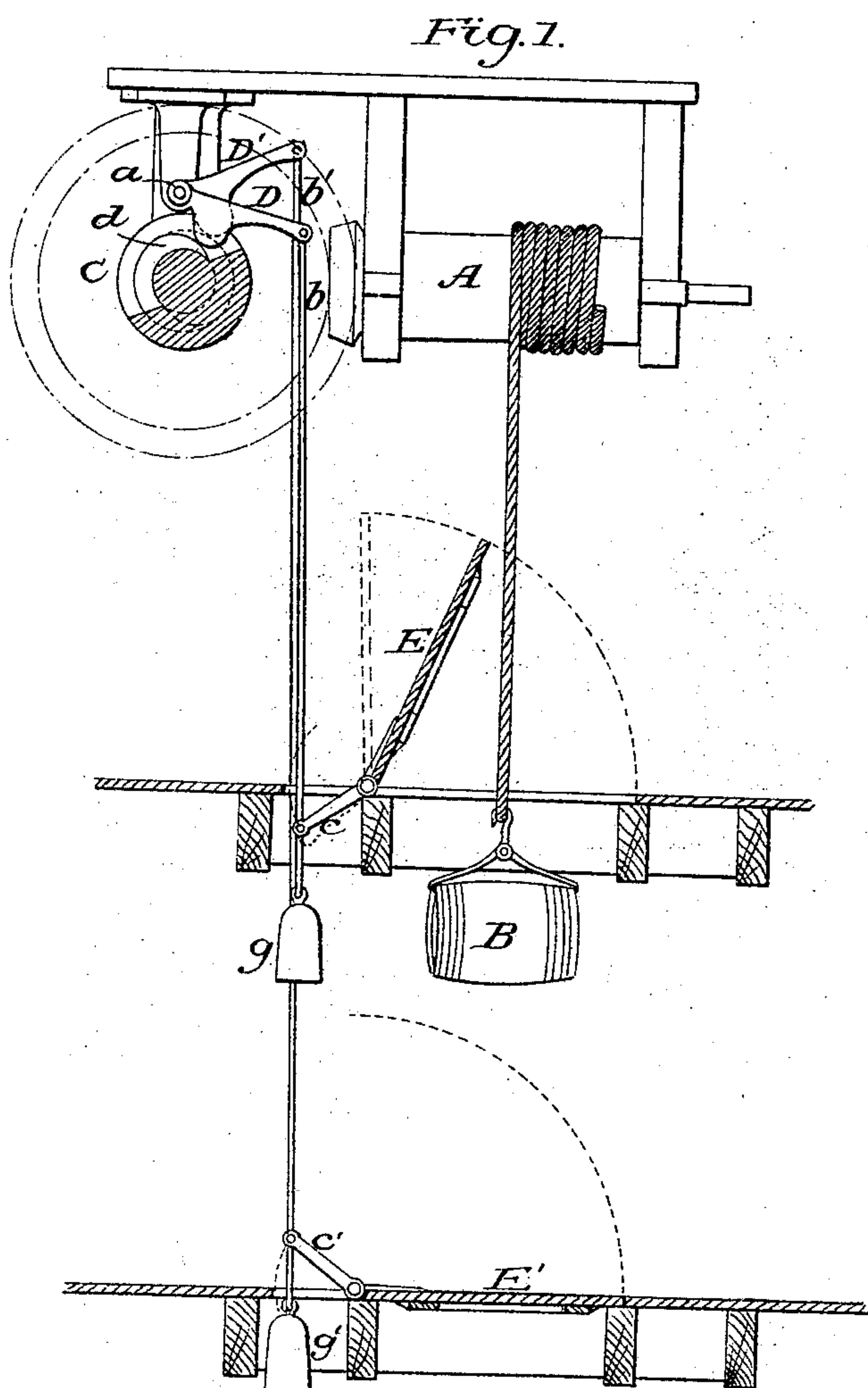


No. 30,134.

PATENTED SEPT. 25, 1860.

E. C. FORD.

APPARATUS FOR OPENING AND CLOSING HATCHWAYS.



Witnesses:

Richard Hopkins
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR OPENING AND CLOSING HATCHWAYS.

Specification of Letters Patent No. 30,134, dated September 25, 1860.

To all whom it may concern:

Be it known that I, ELMER C. FORD, of the city, county, and State of New York, have invented an Improved Automatic Method for Opening and Closing Hatchways; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and to the letters of reference marked thereon.

This invention relates to opening and closing hatchways, where hoisting apparatus is used in stores, warehouses, &c., by means and appliances connected with the hoisting gear. Figure 1, is a longitudinal section of the apparatus, showing its application. Fig. 2, is a view of a spiral cylinder by which the changes are transmitted. Fig. 3, shows its application to a double hatch, and Fig. 4, is a top or plan view of a single hatch.

A, represents the hoisting cylinder, of which, with its rope and load (B,) it is only necessary to remark that it is worked by cogs, pulleys, &c., and is constructed generally and operated in the usual and well known manner.

C, is a spiral cylinder or large screw, that turns upon journals at either end and which gears by cogs into the working cylinder (A,) having thereby its movement from, and its motion timed, by it—giving it thus a relative motion to the other; the screw thread is of a large pitch or incline and is made unusually deep, for the purposes below explained.

D, D', are levers, placed transversely across the screw (C,) and which enter between its threads—resting upon the body of the screw—by a rounded projection (upon the levers) at a little distance from the fulcrum or end, where they are supported by a fixed shaft (a,) that passes through them and upon which they are free to slide or move laterally; these are consequently moved sidewise upon the shaft as the screw is revolved. At the other end of the levers D, D', there is attached (by a pin) the rods b, b', that connect them with the hatches E, E'. The connection is made to an arm c, secured to a shaft placed at one edge of the hatch, or to the hatch itself, which has hinges or axles upon which it swings. The arms c, c' being thus connected with the levers it follows that when they descend the arms descend also and the hatches will thereby be elevated or opened, so likewise when

they are raised the hatches will be closed, or either arm or lever respectively. This is effected by annular cams placed within the spaces of the screw thread. At d, Figs. (1 and 2) these cams are shown; they consist of portions of screw threads that about fill the spaces in the screw (C,) where they are placed, but their thickness in depth is less than the depth of the thread by about one half, so that when they are in their places resting on the body of the screw, its thread projects beyond them sufficiently to allow it to act as a carrier to the levers (D,) still, although presenting a diminished bearing surface at the sides to their action, but sufficient to conduct them over and past the cams. Their spiral length is adapted to the time it is desired (in the revolution of the hoisting gear) to keep the hatch upon which any one of them may be acting closed, and the space between their ends is likewise made to correspond to the time it is desired to keep the hatchway open. The levers (D,) thus resting freely in the thread of the screw, ride over the cams and down upon the body of the screw, alternately, as the same may be revolved and are consequently raised and depressed at their outer ends sufficiently (acting through the rods b, and arms c) to open and close the hatchways. The cams are secured to their places by screws,—pins or in any convenient manner.

Fig. 3, shows a double hatch, which opens from the centers each way upon hinges or axles placed at the sides; it is connected to the actuating gear (by the rod b, and arm c,) as described for the others. Each hatch has also upon them the additional arms h, h, which are connected by the diagonal rod (f), by means of which when one is closed the other is closed and likewise when one is opened the other is opened also.

The action of this improvement is as follows: The cams being set at their proper places relatively to the length of the hoisting rope or position of the weight (B,) suspended thereon, the gear above is put in motion. At the start from the lowest point all the levers are raised and are resting upon the cams (the hatchways being closed). When the load (B,) approaches a hatchway (as at E, Fig. 1,) the lever (D,) descends from the cam to the body of the screw and the hatch is consequently opened; the counter weight g, is for the purpose of aiding its

descent. After the load has passed the lever D, (by the further revolution of the screw,) it meets with another cam upon which it again rises, thus closing the hatchway as soon as desirable after the load has passed and it continues closed until the return of the rope with another load to this point, when, in like manner it opens to allow it to pass, then closes again as before; so also with all the different hatchways through which the same may pass both in ascending and descending. The dotted lines show the movement of the hatches, arms &c.

Various modifications to this invention will suggest themselves—such as having the screw cylinder without cams in the thread, (as above described,) but traversed by a nut connected with a lever, the other end being supported by a fixed bar that has upon it adjustable elevations or cams over which the levers travel and being thus elevated and depressed thereby open and close the hatchways, or the cams may be so arranged as to open the hatchways by the ascent of the levers instead of by their descent as before described. The levers may also be in a fixed position laterally and short lengths of screws for each lever be placed upon a square or feathered shaft (in place of shaft C) and made at liberty to slide thereon, each thus moving independently of the others and (being fixed laterally) as the shaft is revolved the screw, as a consequence, is carried along sidewise past them until meeting with a cam or detent placed thereon, which, coming in contact with the lever, the opening or closing the hatchway is effected.

The hatches, instead of swinging on hinges, may be made to slide on rollers horizontally; which can readily be done by a

system of levers of the pentagraph order, operated by the means substantially above described for opening and closing them vertically. The levers may be of any suitable form and length, and may connect with the screw C, or its equivalent, or to the rods (or chains) b, for actuating the hatches, in any convenient and proper manner, the agents in either case being the screw, cams and levers, but, slightly modified in their arrangement.

The advantages of this improvement are manifold and important, among the least of which is the saving of time and care attendant upon opening and closing hatchways of the common kind. It becomes a safeguard from the danger of being precipitated through them, as generally used, or from the falling of goods, by accident through the different stories of a building, in the act of being conveyed up or down, and the consequent danger therefrom to human life.

Having thus described my invention what I claim therein as new and desire to secure by Letters Patent is—

Opening and closing hatchways automatically, by means of a revolving screw and cams or their equivalents, such cams and screw having a relative motion to the hoisting gear and to the ascent and descent of the load; and which are so arranged and connected with the hatches that each of them respectively shall thereby open at the passing of the load and close again after its passage, substantially as herein set forth.

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Witnesses:

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