(No Model.) 2 Sheets—Sheet 1.

G. S. NICKUM & H. P. BUNKER.

ELEVATOR HATCHWAY GATE.

No. 387,653. Patented Aug. 14, 1888.

Fig. 1.

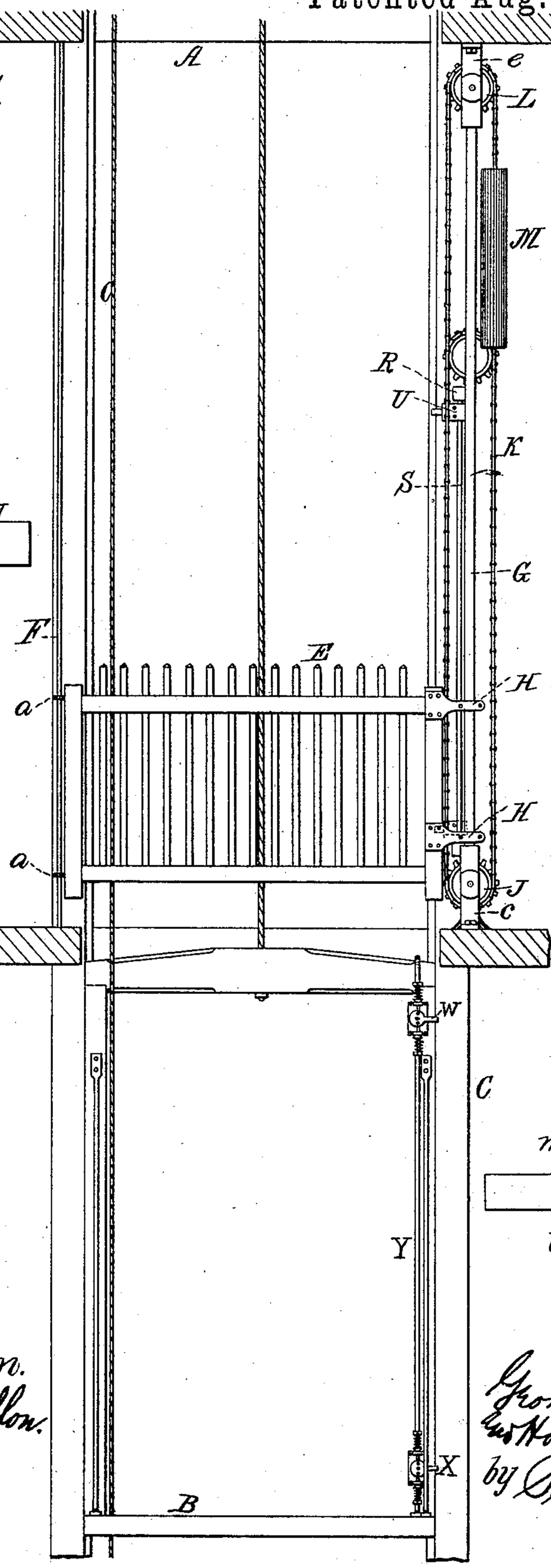


Fig. 2.

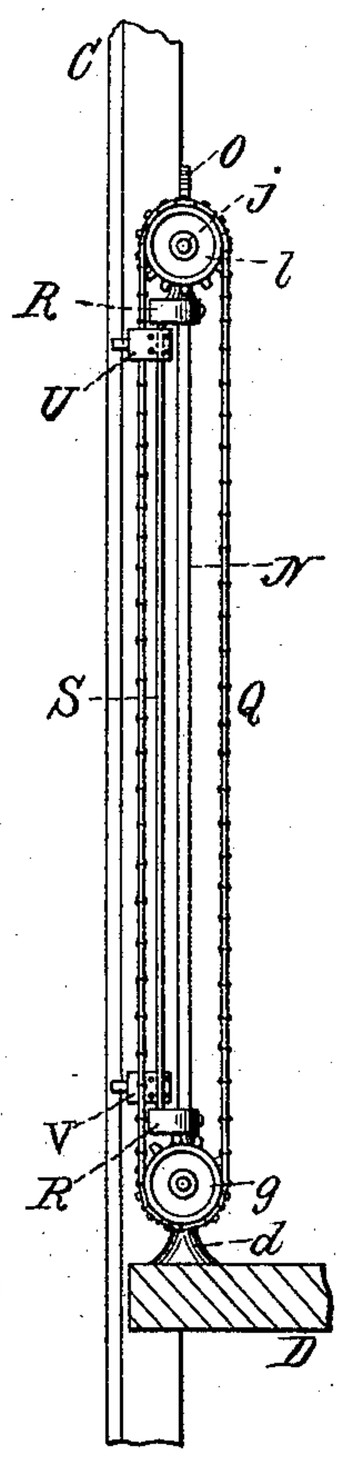


Fig. 3.

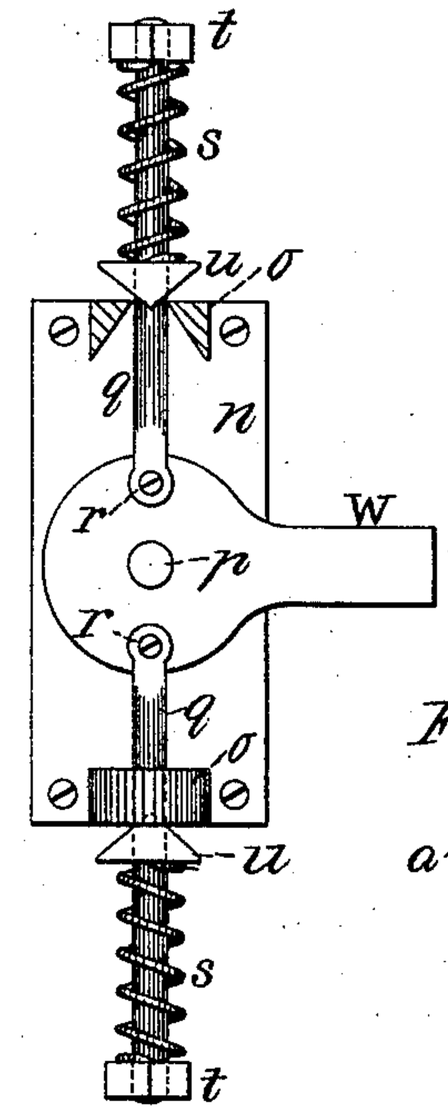


Fig. 4.

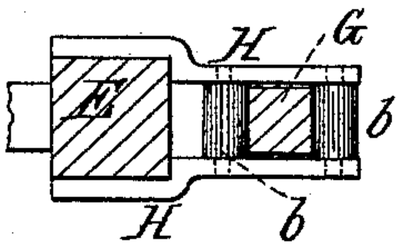
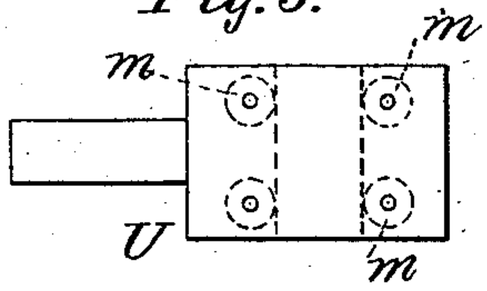


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

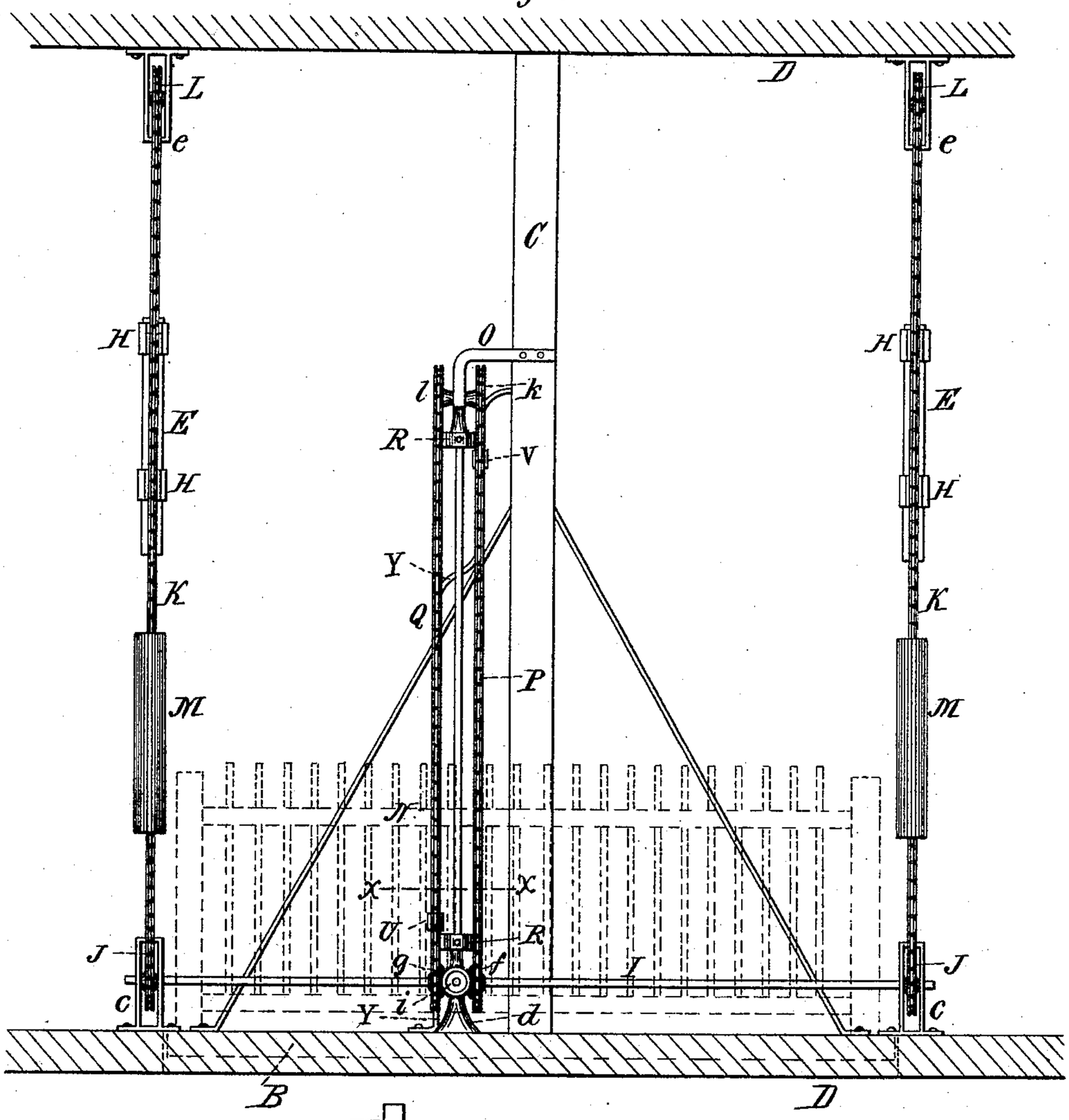
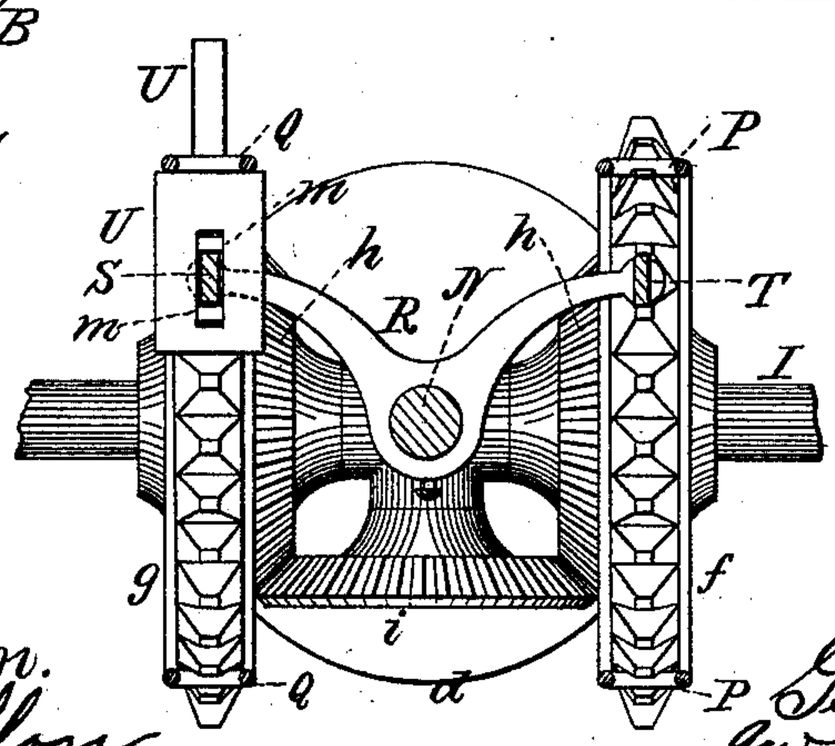


Fig. 7.



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UNITED STATES PATENT OFFICE.

GEORGE S. NICKUM AND HOLLIS P. BUNKER, OF DAYTON, OHIO.

ELEVATOR-HATCHWAY GATE.

SPECIFICATION forming part of Letters Patent No. 387,653, dated August 14, 1888.

Application filed March 3, 1888. Serial No. 266,024. (No model.)

To all whom it may concern:

Be it known that we, GEORGE S. NICKUM and HOLLIS P. BUNKER, both citizens of the United States, and both residents of Dayton, in the county of Montgomery and State of Ohio, have jointly invented certain new and useful Improvements in Automatic Gate-Operating Devices for Elevator-Hatchways, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our invention relates to that class of devices by which the safety gate or gates of an elevator are actuated by the passage of the elevator to open and close the gate or gates, and it has for its object the improvement in the construction and mode of operation of this class of devices.

The novelty of our invention will be herein set forth, and distinctly pointed out in the claims.

In the accompanying drawings, Figure 1, Sheet 1, represents, in sectional elevation, an elevator-shaft with its elevator, and the gate or gates of one floor closed, looking full at the gates. Fig. 2, Sheet 1, is a detail elevation of the primary actuating-chains and their connections. Fig. 3, Sheet 1, is an enlarged elevation, partly in section, of one of the spring-catches. Figs. 4 and 5, Sheet 1, are enlarged detail views, to be referred to hereinafter. Fig. 6, Sheet 2, is a view corresponding to Fig. 1, but with the gates up and looking toward their ends. Fig. 7, Sheet 2, is an enlarged plan view through the dotted line *x x* of Fig. 6.

The same letters of reference are used to indicate identical parts in all the figures.

A represents an elevator-shaft; B, an elevator of the usual or any suitable construction; C, the guide-posts for the elevator, and D two floors of a building—in this instance a factory or warehouse.

Around the hatchway of each floor, assuming the hatchway to be away from a wall, are two permanent safety-railings, as indicated by the dotted lines, Fig. 6, and two vertically-sliding gates, E. These gates may be of the usual or any suitable construction, and are supported on one side by vertical rods F, passing through eyes *a*, projecting from the gates, and on the other side by vertical bars G, passing between guide-rollers *b*, Fig. 4, journaled in castings or plates H, secured to the end post of the gate. It will thus be seen that the gates are free to be raised and lowered bodily upon the guide-rods F and G.

Now, to cause the raising and lowering of the gates by the movement of the elevator in such manner that when the elevator-platform is level with the floor the gates will be up to permit free passage under them, and when the elevator either ascends or descends from such position the gates are simultaneously closed, the following instrumentalities are employed: A shaft, I, is journaled in three bearings, *c c* and *d*, parallel to and close above each floor, along one of the sides of the hatchway and at right angles to the gates E. To each end of the shaft I, in line with each of the gates E, is secured a sprocket-wheel, J, from which a drive-chain, K, extends up around other supporting sprocket-wheels, L, journaled in hangers *e*. In this instance the bearings and hangers *c e* are integral with the guides G; but this is immaterial. The chains K, on their inner sides, are secured to the gates E or to the plate H, and counter-weights M may be secured to the outer sides of the chains to counterbalance the gates. Upon the shaft I, on each side of the bearing *d*, are two sprocket-wheels, *f g*, of which the former is tight upon the shaft and the latter loose. The wheels *f g* are provided on their inner faces with bevel-gears *h*, with which meshes a bevel-pinion, *i*, journaled upon a stud projecting from the bearing *d*. A vertical post, N, is attached to and extends up from the bearing *d*, and is secured at its upper end by a bracket, O, fastened to one of the guide-beams C. This bracket O has projecting spindles *j*, Fig. 2, upon which are journaled two supporting-wheels—in this instance sprocket-wheels *k l*, Fig. 6—the former directly above the wheel *f* and the latter directly above the wheel *g*. A taut drive-chain, P, connects the wheels *f k*, and a similar taut chain, O, connects the wheels *g l*. Near the top and bottom of the post N are secured two forked brackets, R, Figs. 2, 6, and 7, supporting between their ends two vertical guide-bars, S T, arranged in line with and just behind the front sides of the chains O P, respectively. Each of these bars serves as a guide for a projecting

lug, which is secured to the drive-chain and whose rear portion surrounds the bar and has bearing thereon by means of friction-rollers *m*, journaled in said lugs. The lug U is secured to the chain Q and guided by the bar S, while the lug V is secured to the chain P and guided by the bar T. The lugs are so applied to the chains that when the lug U is in contact with the lower bracket R the lug V is in contact with the upper bracket R, and vice versa, for it will be seen that when the lug U is caught and drawn up the rotation of the loose sprocket *g* will impart a reverse rotation to the sprocket *f* through the medium of the pinion *i*, and the lug V will be brought down. In the same manner a reversal of the position of the lugs will occur when the lug V is again lifted.

Suitably secured to the elevator are two self-releasing catches, W X, the former at or near the top of the elevator and in line with the lug V and the latter at or near the bottom or platform of the elevator and in line with the lug U. In the present instance these catches are connected to a bent rod, Y, attached to the elevator, and may be described as follows, reference being had to Fig. 3, where the catch W is shown pivoted to a plate, *n*, secured by clips or otherwise to the rod Y and provided with countersunk lugs *o* at its ends in vertical alignment with the pivot *p* of the catch. Rods *q*, threaded at their outer ends, are passed through the lugs *o*, and are pivoted, as at *r*, to the catch W. Coiled springs *s* surround the rods *q* and are confined between and have their tension regulated by nuts *t* upon the threaded ends of the rods and beveled washers *u* upon the rods bearing against the lugs *o*. The tension of the springs *s* is so adjusted that the catch will be held horizontal with sufficient rigidity to engage with its lug upon the chain and lift said lug, thereby actuating the gates E, as will be presently explained, until the lug is arrested by the upper bracket R, when the springs *s* will yield and permit the catch to be turned and slip past the lug, whereupon the catch will be instantly reset, as will be readily understood.

Assuming the gates E to be down or closed and the elevator to be ascending, it will be seen that the upper catch, W, will engage under the lower lug, V, and raise it, thereby rotating the sprocket *f* and shaft I in such direction as to cause the chains K, through the medium of the sprockets J, to raise the gates until the platform of the elevator has come on a level with the floor, when they will be at their highest position, and the catch W will have passed and been disengaged from the lug V and rest horizontally over it. Should the elevator be now stopped, the gates will remain up; but should it continue to ascend the catch X will immediately upon the platform of the elevator rising above the floor engage with the lug U, which has been brought down, and, carrying it up, will reverse the rotation of the sprocket *f* and shaft I, and thereby lower the gates and bring the lug V down. The same operation of the parts occurs when the elevator descends. For instance, if the elevator, having risen to the upper floor, D, begins to descend, its catch X will engage with the lug U and force the same down, thereby rotating the shaft I, elevating the gates, and carrying up the lug V. If now the elevator continues to descend, its upper catch, W, will engage with the lug V and force it down, thereby rotating the shaft I and lowering the gates, as will be readily understood.

While we have shown the simultaneous operation of two gates, it is evident that the same devices may be employed in the same manner to operate a single gate, as where a wall constitutes one side of the elevator-shaft, or where permanent railings are employed on three sides of the hatchway and but a single gate is desired; also, while we preferably employ the rods S and T to serve as guides for the lugs U V on the drive-chains this is their only office, and they are not essential to the working of the mechanism. The same may be said of the rod N, which serves merely as a means of attachment for the brackets R and as a brace for the bearings O *d*, and which might be dispensed with by securing the brackets R to the bearings O *d* and making the latter sufficiently be strong and secure.

As the only office of the brackets R is to support the guide-rods S and T and serve as stops for the lugs U and V, if the rods S and T are not used the brackets R may also be dispensed with, and any suitable stops employed for the lugs U V, or the sprocket-wheels themselves be allowed to perform that office.

When the guide-rods S and T are dispensed with, the large rear portions of the lugs U and V surrounding said rods are not needed, and each lug may be a simple projection firmly secured to the drive-chain; also, while we have shown the gates counterbalanced by means of the weights M, secured to the chains K, if light gates are used these weights may be dispensed with, as the friction of the rotating parts will be sufficient to counterbalance the gates.

If desired, drums or other wheels might be substituted for the sprocket-wheels J J, and ropes or ordinary chains passed several times around said drums and over wheels or pulleys, in place of the sprocket-wheels L L, be used instead of the drive-chains K, the gates E being secured to such ropes or chains in the same manner as to the drive-chains.

Having thus fully described our invention, we claim—

1. In automatic gate-operating devices for elevator-hatchways, the combination of a horizontal shaft secured near the side of the hatchway, two sprocket-wheels arranged one loose and the other tight upon said shaft and connected by an intermeshing pinion, two supporting-wheels arranged one vertically above each of said sprocket-wheels, two drive-chains,

one connecting each of said sprocket-wheels with its corresponding supporting-wheel, two projecting lugs secured one on each of said chains and so arranged thereon-that when one is elevated the other will be depressed, a vertically-sliding gate operated by said horizontal shaft, and an elevator provided with two catches arranged one in line with each of the lugs on the drive-chains, substantially as described, whereby the movement of the elevator automatically raises and lowers said gate.

2. In automatic gate-operating devices for elevator-hatchways, the combination of a horizontal shaft secured near the side of the hatchway, two sprocket-wheels arranged one loose and the other tight upon said shaft and connected by an intermeshing pinion, two supporting-wheels arranged one vertically above each of said sprocket-wheels, two drive-chains, one connecting each of said sprocket-wheels with its corresponding supporting-wheel, two projecting lugs secured one on each of said drive-chains and so arranged thereon that when one is elevated the other will be depressed, a third sprocket-wheel secured upon said horizontal shaft, a supporting-wheel arranged above the same, a drive-chain connecting said wheels, a vertically-sliding gate secured to said drive-chain, and an elevator provided with two catches arranged one in line with each of the lugs on the first-mentioned drive-chains, substantially as described, whereby the movement of the elevator automatically raises and lowers said gate.

3. In automatic gate-operating devices for elevator-hatchways, the combination of a horizontal shaft secured near the side of the hatchway, two sprocket-wheels arranged one loose and the other tight upon said shaft and connected by an intermeshing pinion, two supporting-wheels arranged one vertically above each of said sprocket-wheels, two drive-chains, one connecting each of said sprocket-wheels with its corresponding supporting-wheel, two projecting lugs secured one on each of said drive-chains and so arranged thereon that when one is elevated the other will be depressed, two additional sprocket-wheels secured to said horizontal shaft, one near each end, two additional supporting-wheels arranged one above each of said sprocket-wheels, two drive-chains, one connecting each of said sprocket-wheels with its corresponding supporting-wheel, two vertically-sliding gates, one secured to each of said drive-chains, and an elevator provided with two catches arranged one in line with each of the lugs on the first-mentioned drive-chains, substantially as described, whereby said gates are automatically and simultaneously raised and lowered by the movement of the elevator.

4. In automatic gate-operating devices for elevator-hatchways, the combination of a horizontal shaft secured near the side of the hatchway, two sprocket-wheels arranged one loose and the other tight upon said shaft and connected by an intermeshing pinion, two supporting-wheels arranged one vertically above each of said sprocket-wheels, two drive-chains, one connecting each of said sprocket-wheels with its corresponding supporting-wheel, two projecting lugs secured one on each of said drive-chains and so arranged thereon that when one is elevated the other will be depressed, two vertical guides, one for each of said lugs, a third sprocket-wheel secured upon said horizontal shaft, a supporting-wheel arranged above the same, a drive-chain connecting said wheels, a vertically-sliding gate secured to said drive-chain, and an elevator provided with two catches arranged one in line with each of the lugs on the first-mentioned drive-chains, substantially as described, whereby the movement of the elevator automatically raises and lowers said gate.

5. In automatic gate-operating devices for elevator-hatchways, the combination of a horizontal shaft secured near the side of the hatchway, two sprocket-wheels arranged one loose and the other tight upon said shaft and connected by an intermeshing pinion, two supporting-wheels arranged one vertically above each of said sprocket-wheels, two drive-chains, one connecting each of said sprocket-wheels with its corresponding supporting-wheel, two projecting lugs secured one on each of said drive-chains and so arranged thereon that when one is elevated the other will be depressed, a third sprocket-wheel secured upon said horizontal shaft, a supporting-wheel arranged above the same, a drive-chain connecting said wheels, a vertically-sliding gate secured to said drive-chain, and an elevator provided with two spring-catches arranged one near the top and one near the bottom of the elevator and one in line with each of the lugs on the first-mentioned drive-chains, whereby the movement of the elevator automatically raises and lowers said gates.

6. The combination of the shaft I, sprocket-wheels *f g*, the former tight and the latter loose upon said shaft, the gears *h h i*, connecting said sprocket-wheels, the supporting-wheels *k l*, drive-chains P Q, projecting lugs U V, the former secured to the chain Q and the latter to the chain P, sprocket-wheel J, secured to the shaft I, supporting-wheel L, drive-chain K, vertically-sliding gate E, secured to the chain K, and elevator B, provided with the spring-catches W X, substantially as and for the purpose specified.

7. The combination of the shaft I, sprocket-wheels *f g*, the former tight and the latter loose upon said shaft, the gears *h h i*, connecting said sprocket-wheels, the supporting-wheels *k l*, drive-chains P Q, projecting lugs U V, secured the former to the chain Q and the latter to the chain P, guide-rods S T for said lugs, brackets or stops R, sprocket-wheel J, secured to the shaft I, supporting-wheel L, drive-chain K, vertically-sliding gate E, secured to the chain K, and elevator B, pro-

vided with the spring-catches W X, substantially as and for the purpose specified.

8. A spring-catch for elevators, composed of the pivoted catch-piece W, plate *n*, perforated lugs *o o*, rods *q q*, pivoted at one end to the catch-piece W, passing through said lugs *o o*, and provided with beveled washers *u u*, nuts *t t*, and springs *s s*, surrounding the rods and interposed between the nuts and washers, substantially as and for the purpose specified.

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