(No Model.)

2 Sheets—Sheet 1.

L. G. KNOWLES, Dec'd.

H. A. KNOWLES, Administrator.

VERTICALLY SWINGING GATE.

No. 411,505. Patented Sept. 24, 1889.

Fig. 1.

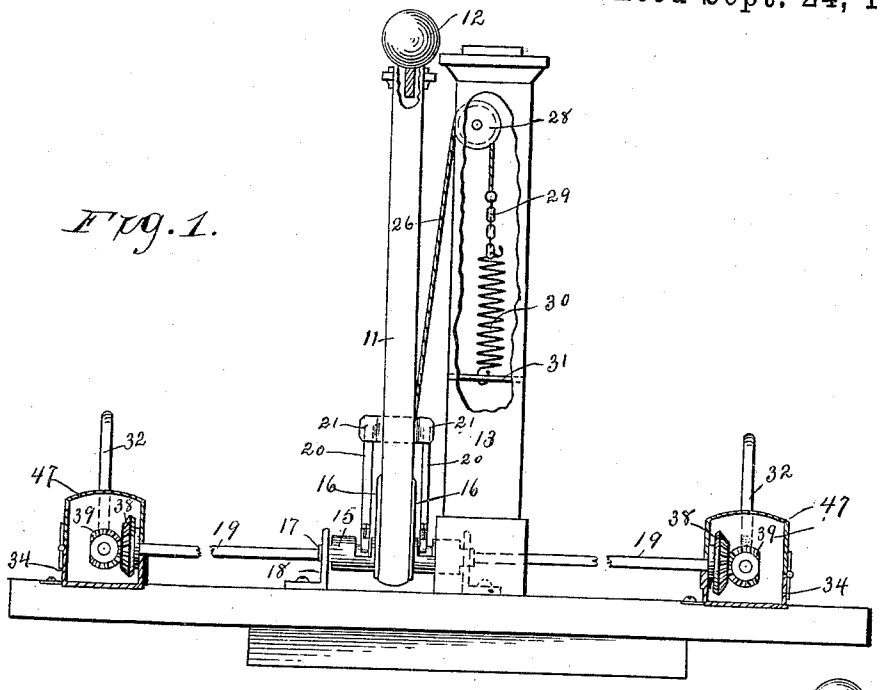
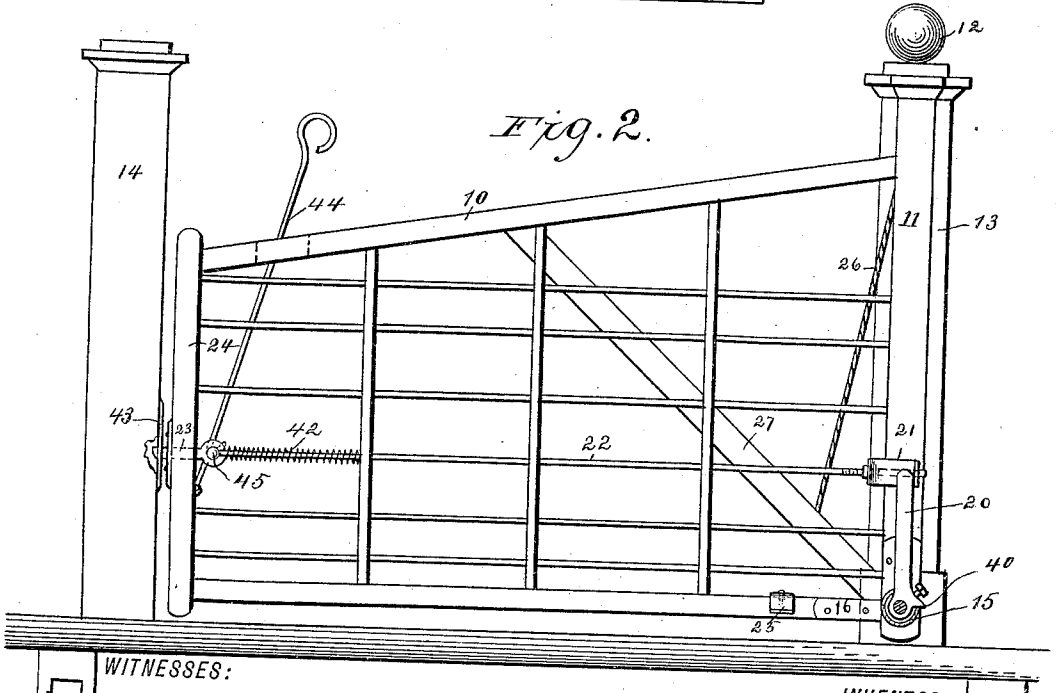


Fig. 2.



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(No Model.)

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Fig. 3.

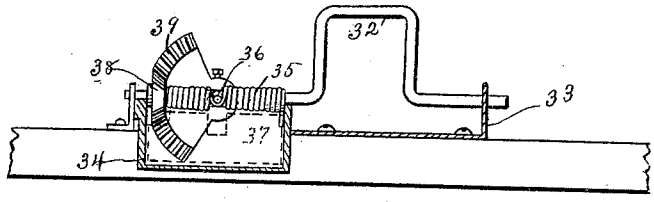


Fig. 4.

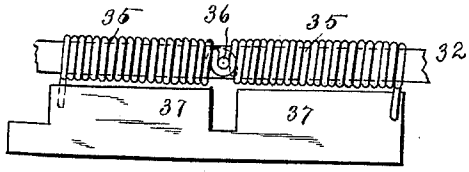


Fig. 5

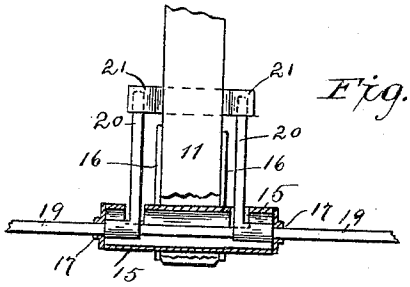


Fig. 6.

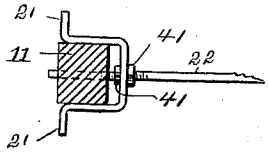


Fig. 7.

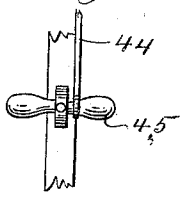


Fig. 8.

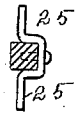
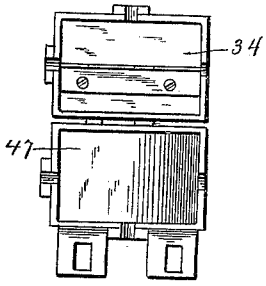


Fig. 9.



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UNITED STATES PATENT OFFICE.

LEWIS GARDNER KNOWLES, OF NEW YORK, N. Y.; HUGH A. KNOWLES ADMINISTRATOR OF SAID LEWIS GARDNER KNOWLES, DECEASED.

VERTICALLY-SWINGING GATE.

SPECIFICATION forming part of Letters Patent No. 411,505, dated September 24, 1889.

Application filed November 18, 1885. Serial No. 183,234. (No model.)

To all whom it may concern:

Be it known that I, LEWIS GARDNER KNOWLES, a citizen of the United States, and residing at New York, county and State of New York, have invented certain new and useful Improvements in Vertically-Swinging Gates, of which the following is a specification.

This invention relates to gates (designed for carriage-ways) that are opened vertically by the wheels of a vehicle coming in contact with suitably-arranged mechanism connected to the operating appliances of the gate.

The objects of the improvements are to design a gate that is so counterpoised as to require a minimum power to operate it; to provide for opening and shutting the gate by hand, when necessary, without engaging the heavier mechanism designed to be operated by a vehicle; further, to improve the automatic fastening means, and to protect the operating mechanism from ice, snow, and dirt.

The invention is hereinafter described, and illustrated in the accompanying drawings, which form part of this description, and the novel features for which protection is desired are pointed out in the claims at the end hereof.

In the drawings, in which like parts are designated by like figures of reference, Figure 1 shows an end view of the gate with certain parts broken away and other parts in section to facilitate the illustration. Fig. 2 is a side view. Fig. 3 is a detail sectional view of one of the wheel-irons and the gearing with which it is connected. Fig. 4 is an enlarged detail view of the springs which cooperate with the wheel-iron. Fig. 5 is a longitudinal vertical sectional view of the hollow shaft to which the gate is secured, with certain other parts of the structure in elevation. Fig. 6, 7, 8, and 9 are details hereinafter referred to.

10 indicates the gate, which will preferably be of the form shown, and it is constructed so as to be heavier at its pivoted end by using at that end a large and long end rail 11, which is provided with a weight 12 at its top. By this means the gate will be balanced in the middle of the one-quarter of a circle it traverses in being opened or shut.

13 indicates the gate-post at the pivoted end of the gate, and 14 the post at the latch end. The post 13 is made hollow to receive certain parts of the operating mechanism, as presently explained.

At the lower end of rail 11 is secured the hollow axle 15, which passes through said rail and is rigidly held in place through the medium of the angle-irons 16, the ends of said hollow axle being provided with bearings 17, seated in the supporting-irons 18.

19 indicates a shaft which passes through the hollow axle 15 and carries upon each end a sector or gear wheel, as shown. The hollow axle 15 is cut away on each side of the gate-post to expose the shaft 19, in order that the arms 20 may be secured to said shaft in convenient proximity to the rail 11. The arms 20 are rigidly secured to shaft 19, and hence move with it, and the outer ends of said arms co-operate with the lugs 21, arranged on the rod 22, which rod passes through the end rail 11 and is connected at its opposite end to the latch-bolt 23, which plays through end rail 24, as indicated in Fig. 2. The ends of said arms 20 also coact with lugs 25, secured to the lower horizontal rail of the gate, the arms bearing upon the last-mentioned lugs when closing the gate and upon lugs 21 when opening it.

By making the transverse cut in the hollow axle 15 about half the diameter of said axle the gate, to which said axle is fixedly secured, as explained, may be opened and closed by hand without bringing into play the arms 20 and co-operating-lugs 21 and 25, and hence without affecting the heavy mechanism designed to be operated by the wheels of the vehicle.

26 indicates a wire rope having one of its ends secured to the transverse gate-brace 27, extending up and passing over a pulley 28, journaled in the top of the hollow gate-post 13 and secured at its opposite end to chain-links 29, the latter being secured to spiral spring 30, whose lower end is affixed to bolt 31, passing transversely through post 13. The point of connection of the wire rope 26 to the transverse brace 27 is so determined that when the gate is revolved to the central or balancing point the said rope 26 will be substantially vertical or in a line with the

vertical axis of the pulley 28 and spring 30, the said spring, when the parts are in the position indicated, being hooked up by chain-links 29 to such a tension as to suitably counterpoise the gate.

The wheel-irons 32, the construction of which is shown in Fig. 3, have bearings in the angle-irons 33 as well as in the boxes 34. Normally the wheel-irons 32 are in a vertical position, as shown in Fig. 1, being held (and returned) in such position by the spiral springs 35, which encircle that end of the wheel-iron which has its bearings in the box 34. The springs 35 have one of their ends secured to a transverse pin 36, and their other ends bear upon opposite sides of lugs 37 within box 34, and thus said springs are caused to exert a pressure in opposite directions, whereby as the wheel-irons are turned toward or from the gate they exert the requisite force to restore said irons to a vertical position when the weight of the vehicle is removed therefrom. Upon the end of that arm of the wheel-iron which has its bearings in the box 34 there is affixed the bevel-pinion 38, which meshes with the bevel sector or gear-wheel 39 on the end of the shaft 19, by which means the said shaft is rotated as the wheel-iron is operated upon by a vehicle, the rotation of said shaft 19 carrying with it, as before explained, the arms 20, the toes 40 at the lower end of said arms bearing upon the outer edges of the transverse cuts in the hollow axle 15 as the shaft 19 revolves in the direction to open the gate, the latter being thus revolved to the balancing-point or one-half of the quarter-circle it traverses in opening, beyond which point the momentum completes the operation of opening. The extent of movement of the wheel-irons 32 is one-quarter of a circle in either direction from their normally-vertical position, and the relation of the pinions 38 to the sector or gear wheels 39 is such that the shaft 19 rotates at the same time one-eighth of a circle in either direction.

In closing the gate the arms 20 are brought in contact with the lugs 25, where they remain until the balancing-point is reached, when gravity completes the closing operation.

The lugs 21 may be adjusted on the rod 22 by means of the nuts 41, in order that the relation of said lugs and the arms 20, when first brought in contact in the act of opening the gate, may be such as to insure a sufficient movement of rod 22 against the resistance of spring 42 to relieve the bolt 23 from engagement with the latch-catch 43 on the post 14. When said arms 20 are relieved from contact with lugs 21, the spring 42 restores the rod and its attached bolt to their normal position, when the said bolt will automatically slide into the latch 43, thus fastening the gate.

The rod 44, which is secured to some suitable part of the gate and bears against the handle 45 and passes through a slot in top rail 46, serves as a convenient means for a horseman to unlatch and lift the gate without dismounting.

The boxes 34 are provided with covers 47, which are provided with bearings, which, in conjunction with the bearings in the edge of the ends of said boxes 34, receive and support the shaft 19 and wheel-iron 32. By having the boxes 34 covered, as shown, the gearing and springs within the said boxes are protected from dirt and snow and damage incident to exposure.

I am aware that prior to my invention gates have been constructed to swing vertically in opening and closing, and I do not therefore claim, broadly, means for operating a gate in that way.

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

1. A vertically-swinging gate provided with an axle 15, in combination with shaft 19, arms 20, secured to said shaft, stops with which said arms co-operate, and wheel-irons geared to shaft 19, substantially as set forth.

2. In combination with the pivoted gate, wheel-irons, shaft and gearing, a hollow post, as 13, pulley 28, spring 30, and cord 26, connected to said spring and secured to the gate, substantially as and for the purpose set forth.

3. The gate 10 and hollow axle 15, cut away, as shown, and supported in bearings 18, combined with shaft 19, wheel-irons and gearing, and arms 20, mounted upon shaft 19, and provided with toes at their lower end, as 40, and stops 21 and 25, substantially as set forth.

4. In combination with the gate, the rod and spring 22 and 42, bolt 23, stops 21, arms 20, shaft 19, and wheel-irons and gearing, substantially as set forth.

5. The gate provided with a latch-bolt connected to rod 22, in combination with handle 45, rod 44, shaft 19, and arms 20, connected with said rod 22, substantially as set forth.

6. A vertically-swinging gate pivoted upon a hollow axle suitably supported in bearings and provided with means for securing it closed, in combination with a weighted end rail, as 11 12, shaft 19, provided with arms co-operating with said hollow axle and with stops affixed to the gate, wheel-irons, as 32, and gearing connecting said wheel-irons and shaft 19, substantially as set forth.

7. In a vertically-swinging gate, a hollow axle mounted in bearings and serving as the pivot for the gate, in combination with a weighted end rail, wheel-irons and actuating gearing, and a hollow post provided with a pulley near its top, a spring, and a cord connecting the spring with the gate and coacting with the pulley, substantially as set forth.

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