

(No Model.)

3 Sheets—Sheet 1.

A. E. FINLEY.
RAILWAY SWITCHING APPARATUS.
No. 570,988. Patented Nov. 10, 1896.

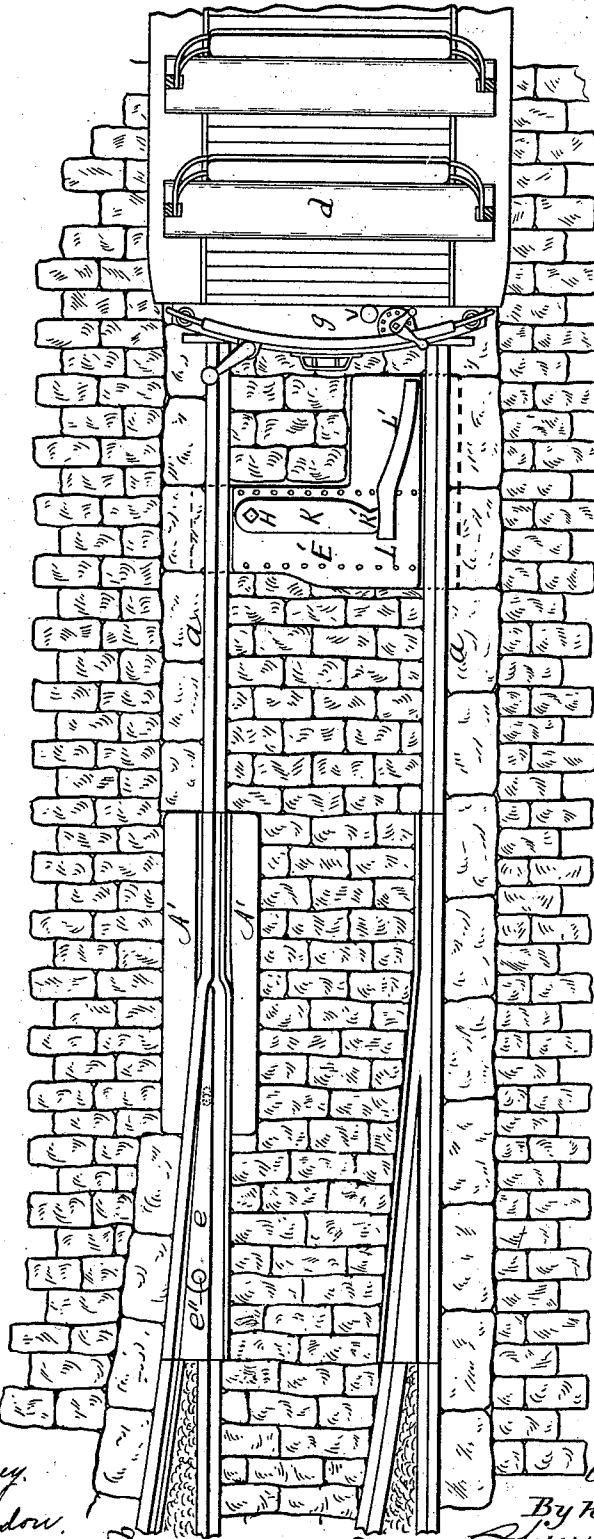


FIG. 1.

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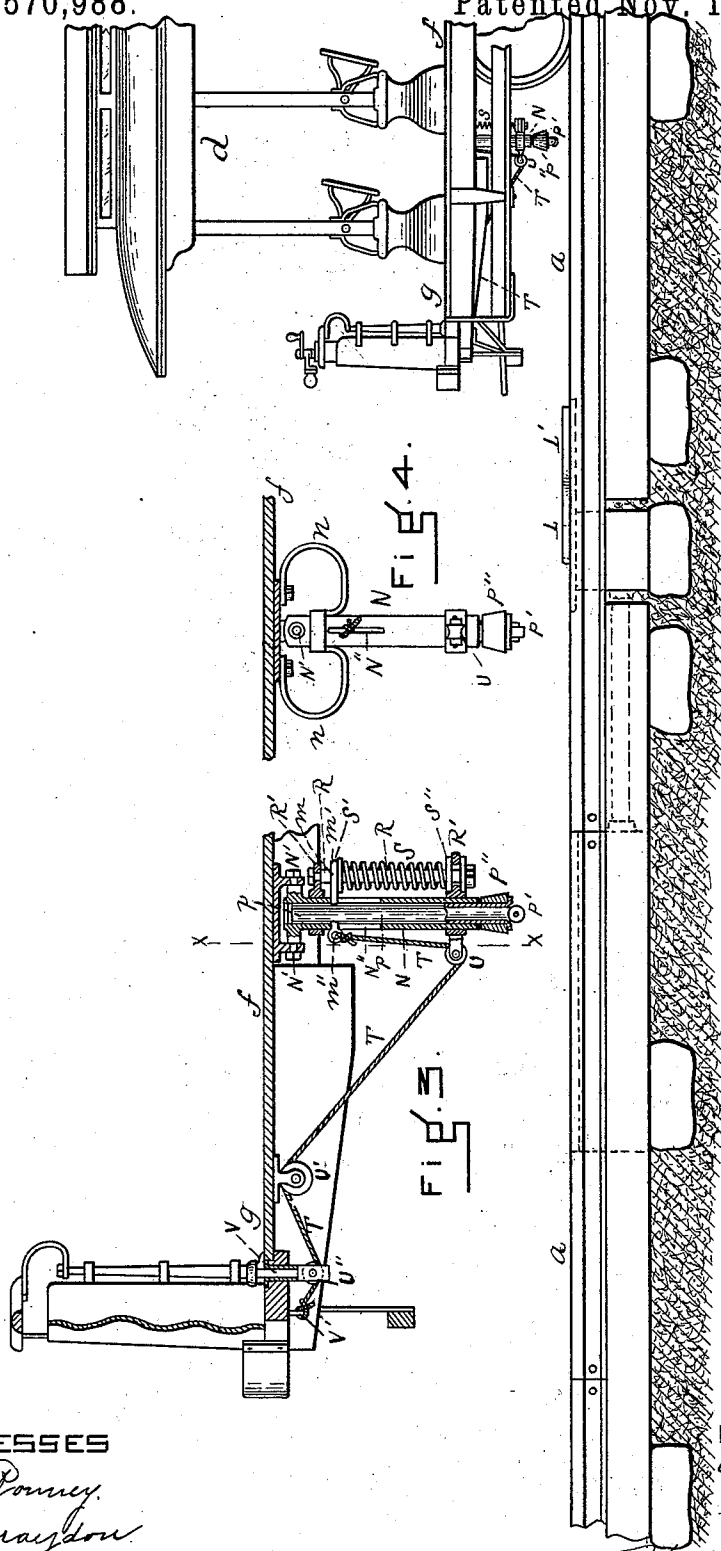
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A. E. FINLEY.
RAILWAY SWITCHING APPARATUS.

No. 570,988.

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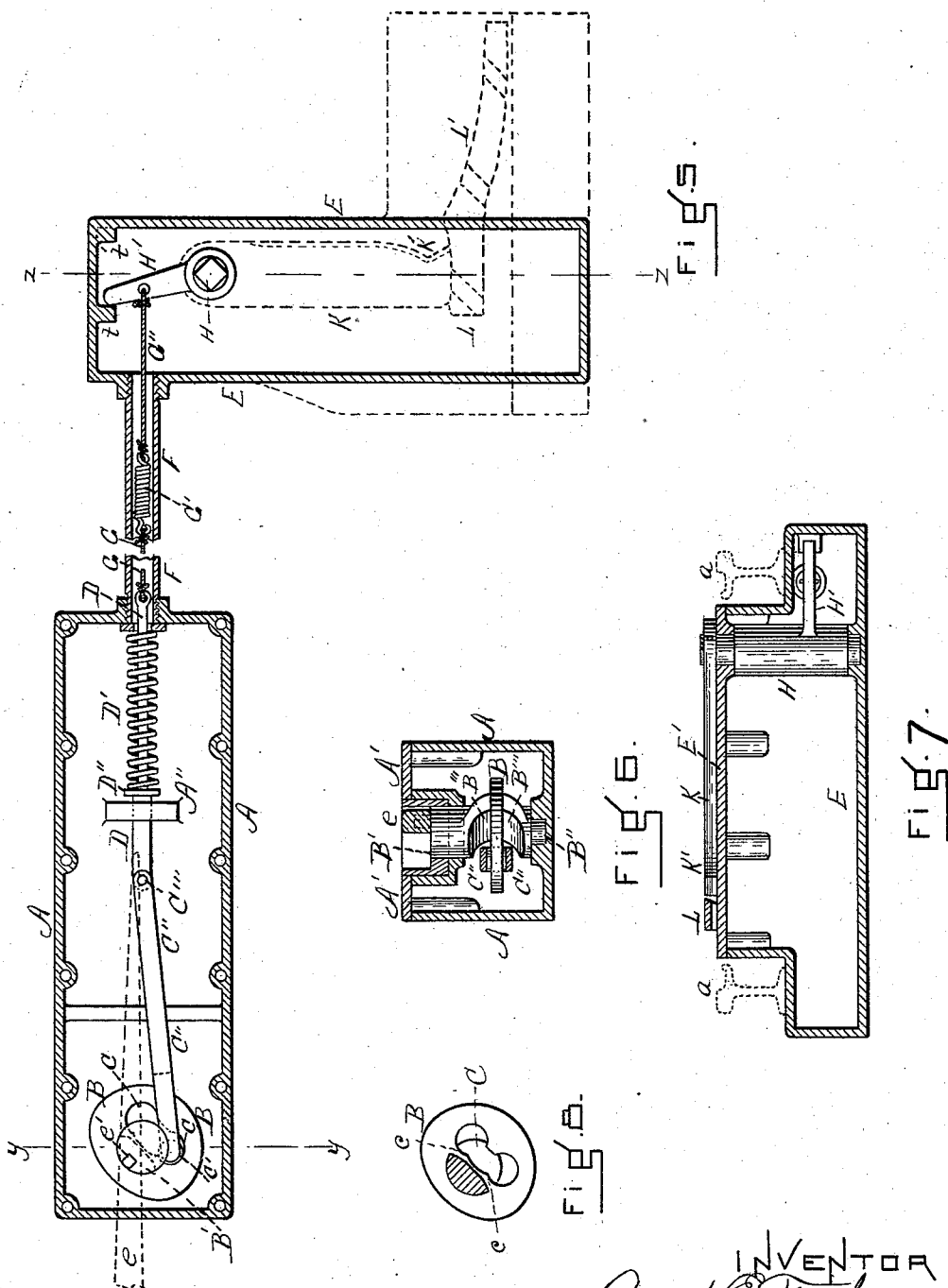
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3 Sheets—Sheet 3

A. E. FINLEY.
RAILWAY SWITCHING APPARATUS.

No. 570,988.

Patented Nov. 10, 1896.



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RAILWAY SWITCHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 570,988, dated November 10, 1896.

Application filed March 14, 1896. Serial No. 583,225. (No model.)

To all whom it may concern:

Be it known that I, AVARD E. FINLEY, a subject of the Queen of Great Britain, residing in Everett, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Railway Switching Apparatus, of which the following is a specification.

This invention relates to that class of railway-switches in which the switch-tongue is operated from the car; and it consists in the novel construction and arrangement of parts described below, whereby the operation is rendered more certain as the car passes over the switch, whereby the parts are rendered less liable to injury, and the apparatus and operation thereof simplified and improved in various details.

The nature of the invention is fully described below and illustrated in the accompanying drawings, in which—

Figure 1 is a plan view showing a portion of a street-railway equipped with my improved switching apparatus and a portion of a street-car approaching the same. Fig. 2 is a side elevation of the same. Fig. 3 is a central longitudinal vertical section of a portion of a car provided with means for operating the switch. Fig. 4 is a transverse vertical section taken on line *x*, Fig. 3. Fig. 5 is a horizontal section taken through the switching mechanism. Fig. 6 is a vertical section taken on line *y*, Fig. 5. Fig. 7 is a vertical section taken on line *z*, Fig. 5. Fig. 8 is a plan view and part section of the cam-wheel.

Similar letters of reference indicate corresponding parts.

a represents the rails of the main track, *b* the rails of the side-track, and *e* the switch-tongue.

d represents an ordinary street-car, of which *f* is the floor, and *g* the front platform.

A represents a box, of which *A'* is the cover, said box being set into the pavement substantially flush with its surface beneath the rail *a* of the main track, which leads to the switch-tongue *e*. This box contains, near one end and directly under the switch-tongue, a disk or cam-wheel *B*, laid horizontally therein and provided with the integral hubs or axles *B'* *B''*, by means of which the cam-wheel has its bearings in the top and bottom of the box

and is adapted to reciprocate rotatively therein. The upper hub *B'* extends through a corresponding opening in the top plate or cover *A'*, being flush with the upper surface thereof, and a pin or lug *e'* is located eccentrically upon and extends up from the upper hub *B'* into engagement with the under side of the switch-tongue *e*, which is suitably recessed for the purpose. The point at which the pin *e'* engages the switch-tongue is some distance from the rear end of said tongue and from the point *e''*, at which said tongue is pivotally connected with the track. The cam-wheel or disk *B* is provided with the cam-slot *C*, of the peculiar shape shown, such shape approaching that of the letter *C*. Within this wheel is a roller *C'*, supported by the horizontal link *C''*. It will be observed that the hubs *B'* *B''* are cut away at *B'''* (see Fig. 6) for the purpose of accommodating the link in its connection with the cam-slot in the wheel. The other end of this link *C''* is pivotally secured at *C'''* to the horizontal reciprocating rod *D*, supported near one end by the upright *A''* in the box *A* and extending at its other end through the farther end of said box. A spiral spring *D'* lies between the farther end of the box and a suitable flange or rest *D''* rigid on the rod *D*. Another box *E*, provided with the cover *E'*, is laid substantially flush with the surface of the pavement at a short distance from the box *A* and at right angles therewith, said box *E* being between the box *A* and the approaching car. A pipe or conduit *F* connects these boxes beneath the pavement, as shown in Fig. 5.

A cord or chain *G* extends from one end of the rod *D* within the pipe *F* to a spiral spring *G'*, and the other end of this spring has secured to it a cord *G''*, which extends and is secured at its opposite end to the arm *H'*, extending from the vertical pin or shaft *H*, having its bearings in the top and bottom of the box *E*. (See Figs. 5 and 7.) The upper end of this shaft *H* extends through the top *E'* of the box *E* and is squared to receive the flat horizontal actuating-arm *K*, which lies on the top of the upper plate *E'*, as shown in broken lines in Fig. 5 and in full lines in Fig. 7. This arm is adapted to be engaged by a projection extending downward from the car, as below described, and is provided on the edge next

the approaching car with a notch K'. Secured to the top of the box E, next the end of the actuating-arm K and at substantially right-angles thereto, is a guide L. (Illustrated in full lines in Figs. 1, 2, and 7 and in broken lines in Fig. 5.)

N, Figs. 2, 3, and 4, is a vertically-hanging tube or pipe pivoted at N' to the under side of the car-body at a suitable distance from the front end thereof and adapted to swing transversely with the car. The extent of this sidewise swing is, however, limited by the springs *n*, preferably of substantially C shape, and having their upper ends secured to the car-body and their lower ends secured to the hanging tube N, as shown. The tube N is slotted at N'' to receive the pin *m*, said pin extending through an inner tube or plunger P, to whose lower end is secured a roller P'. The end *m'* of the pin *m* is looped to embrace the vertical rod R, which is supported by brackets R', extending horizontally from the outer tube N. A spiral spring S is confined between a ring S', loose on the rod R and situated beneath the looped end *m'* of the pin *m*, and the ring S'', resting on the lower bracket R'. A cord T has one end secured to an eye *m''*, and thence passes under a pulley U, extending from the lower bracket R', thence over a pulley U', secured to the under side of the car, and thence under a pulley U'', which is secured to the lower end of the plunger V, extending up through the platform and adapted to be pressed by the foot of the driver or motorman. The forward end of this cord T is tied at V' to the under side of the platform, as shown in Fig. 3.

The normal position of the mechanism connected with the car is that indicated in Figs. 2, 3, and 4, that is to say, with the plunger or engaging finger P raised from the track and held in such position by the spring S. As the car approaches the switch, as indicated in Figs. 1 and 2, the motorman presses down the plunger V with his foot, thus pressing down the cord T under the pulley U'', with the effect of drawing down the pin *m* within the slot N'' against the power of the spring S, thus lowering the plunger or inner tube P. As soon as this is done the wheel P' on the lower end of the plunger facilitates the movement of the plunger over the ground or pavement until said plunger reaches the actuating-arm K. As it approaches this arm it is guided thereto, and especially to the notch K' therein, by the guide L, whose rear portion L' catches the plunger P in case its approach is not on the proper line and guides it to said notch. The plunger is rendered capable of being thus guided by the pivotal character of the connection of the tube N with the car, as shown at N', and it is prevented from a serious divergence from a vertical line and also returned to said vertical line after it has been released from the guide L by the springs *n*. As soon as the lower end of the plunger P comes in contact with the actuating-arm K

the further progress of the car causes the plunger to swing said arm forward, thus partially rotating the shaft H and swinging the arm H' correspondingly rearward from the position shown in Fig. 5. This pulls back the cords G'' G, connected by the spring G', which spring is sufficiently strong not to be expanded by this movement, and hence draws back the rod D against the power of the spring D', and hence the link C'', which, by means of the roll C' lying in one end of the cam-groove C, pulls said end of the groove rearward and partially rotates the cam-wheel B, whose upper hub B' swings the switch-tongue by means of the engaging pin *e'*. As soon as this is accomplished the motorman releases the plunger V, which is immediately pressed up into its former raised position by the cord T, and the spring S lifts the inner tube or plunger P into the normal position indicated in Fig. 3. As soon as the lower end of the plunger P has slipped by the end of the actuating-arm K the spring D', acting directly on the rod D and through the cords G G'' on the arm H', quickly pulls said arm H' back into its original position, and by means of the shaft H does the same by the actuating-arm K. This sudden expansion of the spring D' acts on the rod and link D C' in such a manner as to force them quickly forward, and the effect is to cause the roller C' to jump quickly to the other end of the cam-groove C, the cam having been swung past the center by the first forward movement of the actuating-arm K in swinging the switch-tongue. Which-ever way the switch lies and whichever end of the cam-groove is forward the movement of the arm K, as actuated by the plunger on the car, will swing said cam-wheel past the center and move the switch-tongue. The movement of the arm H', and hence of the arm K, is limited by the stops *t t'*, Fig. 5. In case it is desirable so to do the switch-tongue may be moved by the hand or by a suitable tool in the hand by applying said tool directly to the tongue instead of moving it through the medium of the arm K and intermediate mechanism. This could be done for cleaning purposes, or in case the tongue were forced by a heavy wheel there would be no breakage, as it would simply swing over and could easily be operated, if desired, from the approaching car.

The spring G' is a strong spring and is practically a part of the cord G G''; but in case the parts are being forced in any manner this spring will yield and prevent breakage. It is necessarily of course stronger than the spring D', which is expected to yield with every operation of the switch.

The guide L L' may not always be necessary, but under certain conditions it renders the engagement of the actuating-arm K more certain, as, for example, in case the notch K' should become filled with snow.

The plunger P extends down when raised below the lower end of the tube N and has

loose upon it next said lower end a sleeve or ring P". This sleeve is made cone-shaped, as shown, so that when the plunger comes in contact with either the guide L or the actuating-arm K the free sleeve serves to decrease the friction, and also by means of its cone shape it has a tendency to work down toward the ground rather than to override the guide or the actuating-arm. This is because the sleeve is broadest or flaring at its lower end. In order to make this action more sure, the inner edge of the guide L and the rear edge of the arm K are beveled inwardly toward their under sides, as shown in Fig. 7.

By reference to Fig. 8 it will be seen that the cam-slot C in the wheel B is so formed as to provide two slight shoulders c. These shoulders act as locks upon the roller C', so that when the said roller is at either end of the cam-slot the shoulder near that end locks it in such position. Nevertheless this locking is not so absolute as to prevent the shoulder from being overridden by the roll in case sufficient force is applied, but the roller is sufficiently locked to prevent it from slipping over the shoulder c (thus swinging the switch-tongue) by any ordinary means.

The drawings illustrate my apparatus as applied to and used in connection with a street-railway car and track, but it may be used in connection with any style of car and track to which it is applicable.

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

1. In a switching apparatus of the character described, the disk or cam-wheel B set horizontally beneath the switch-rail and provided with the upper and lower hubs or axles B', B"; a suitable box A supporting said wheel; the pin e' set eccentrically on and extending up from the upper surface of the upper hub; and the switch-tongue pivoted to the track and engaged at a suitable distance from its pivot by said pin, substantially as described.

2. In a switching apparatus of the character described, the disk or cam-wheel B set horizontally beneath the switch-rail and provided with the upper and lower hubs or axles B', B"; a suitable box A supporting said wheel; the pin e' set eccentrically on and extending up from the upper surface of the upper hub; the switch-tongue pivoted to the track and engaged and adapted to be operated by said pin; the actuating-arm K adapted to be engaged by mechanism connected with the car; and mechanism intermediate with said arm and cam-wheel whereby the latter is sufficiently rotated to swing the switch-tongue, substantially as set forth.

3. In a switching apparatus of the character described, the box A; a disk or wheel supported therein and provided with an eccentrically-located pin which extends up into engagement with the switch-tongue; the horizontally-reciprocating rod or bar D supported by said box and held normally forward, that

is to say, toward the switch-tongue, by a spring; the link C' connecting said bar and wheel; the box E; the shaft H supported therein; the actuating-arm K adapted to be engaged from the car; the arm H' extending from said shaft; and a suitable connection extending from said arm H' to said rod D whereby motion is communicated from the former to the latter, substantially as described.

4. In a switching apparatus of the character described, the box A; the cam B provided with the upper and lower hubs B' B", said upper hub engaging the switch-tongue by means of an eccentrically-located pin, said hubs being cut away or recessed at B' as described, and said cam-wheel being provided with the cam-slot C; the horizontally-reciprocating bar D supported in said box; the spring D' on said bar; the link C' connecting said bar and cam-wheel; the box E provided with the stop t; the vertical shaft H having rigidly secured to it the actuating-arm K and the arm H'; the conduit F connecting the boxes A and E; and connecting mechanism extending from said arm H' through the conduit to said bar D, substantially as described.

5. In a switching apparatus of the character described, in combination, a switching mechanism; the horizontally-swinging arm K set transversely with the track, provided upon the edge next the approaching car with the engaging notch K' and adapted to actuate said mechanism; and the guide L set substantially longitudinally with the track and at right angles with said arm K and extending to the outer or free edge of said arm, substantially as set forth.

6. In a switching apparatus of the character described, the combination of the tube N extending down from the under side of the car and slotted at N"; the plunger P moving vertically in said tube; the vertical rod R supported by said tube and surrounded by a spiral spring; the pin m extending through the slots N" and the plunger P and into engagement with said spring; and a cord or chain extending from said pin to mechanism within reach of the motorman, whereby the said pin is moved downward in the slots for the purpose of bringing the plunger into engagement with said actuating-arm and returned by said spring, substantially as set forth.

7. In a switching apparatus of the character described, the combination of the tube N pivotally hung at N' to the under side of the car-bottom so as to swing transversely but not longitudinally with the car; the flanking-springs n, connected with the car-body and with the opposite sides of the tube N whereby said tube is allowed a limited amount of movement but held normally in a vertical position; and a plunger supported by said tube and adapted to be moved down into engagement with the actuating-arm, substantially as described.

8. In a switching apparatus of the character described, the disk or cam-wheel B set beneath the switch-rail and adapted to operate the switch-tongue by means of a suitable connection therewith, said wheel being provided
5 with the cam-slot C of substantially the shape shown and formed with the shoulders *c*;

and mechanism engaging with said cam-slot whereby the wheel is partially rotated, substantially as set forth.

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Witnesses:

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