(No Model.) 6 Sheets—Sheet 1.

# C. E. GAREY.

## RAILWAY SWITCH.

No. 473,387. Patented Apr. 19, 1892.

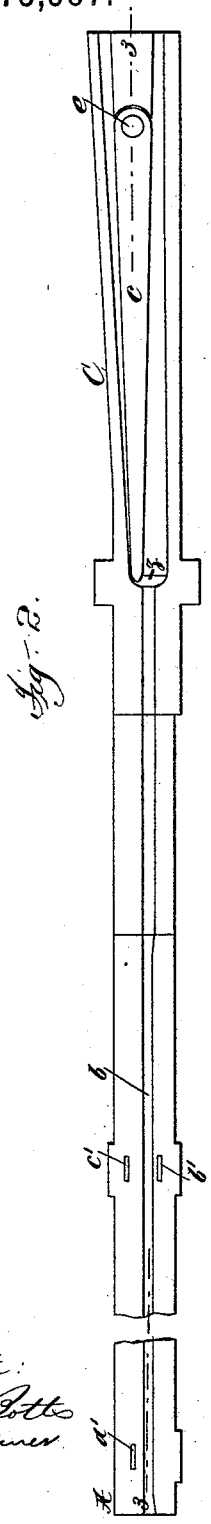


Fig. 2.

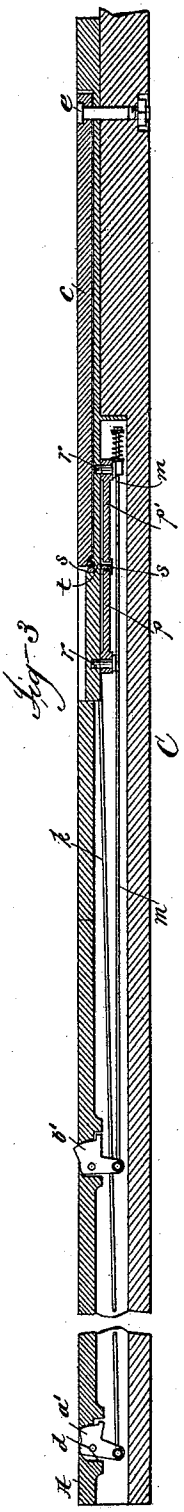


Fig. 3

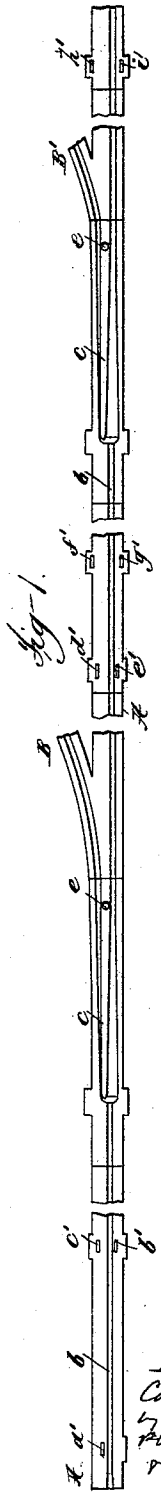


Fig. 1.

Attest:
Leo. A. Potts
T. H. Palmer

Inventor
Caleb E. Garey
by Philipp Philipp
& Hurley Attys

(No Model.) 6 Sheets—Sheet 2.

# C. E. GAREY.

## RAILWAY SWITCH.

No. 473,387. Patented Apr. 19, 1892.

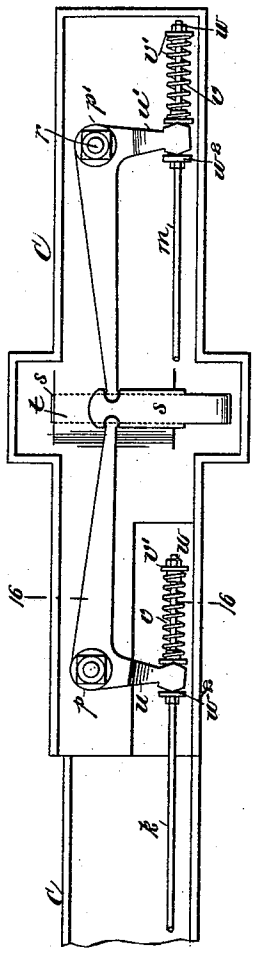


Fig. 5.

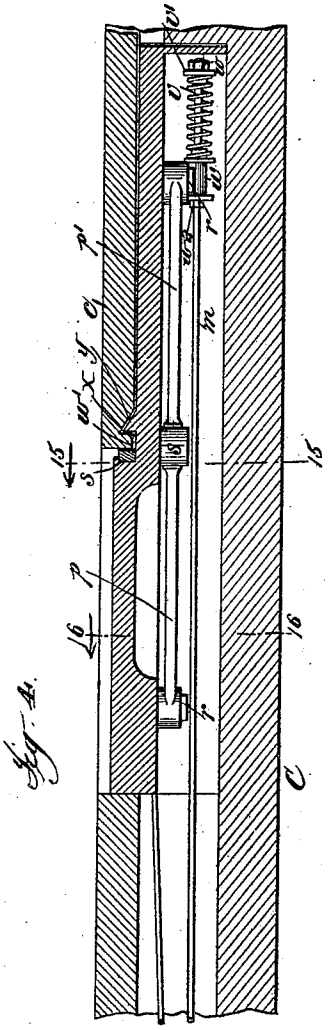
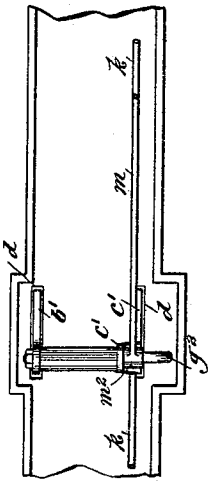
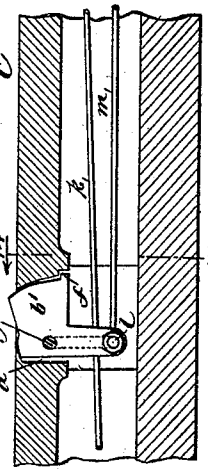


Fig. 4.





Attest.
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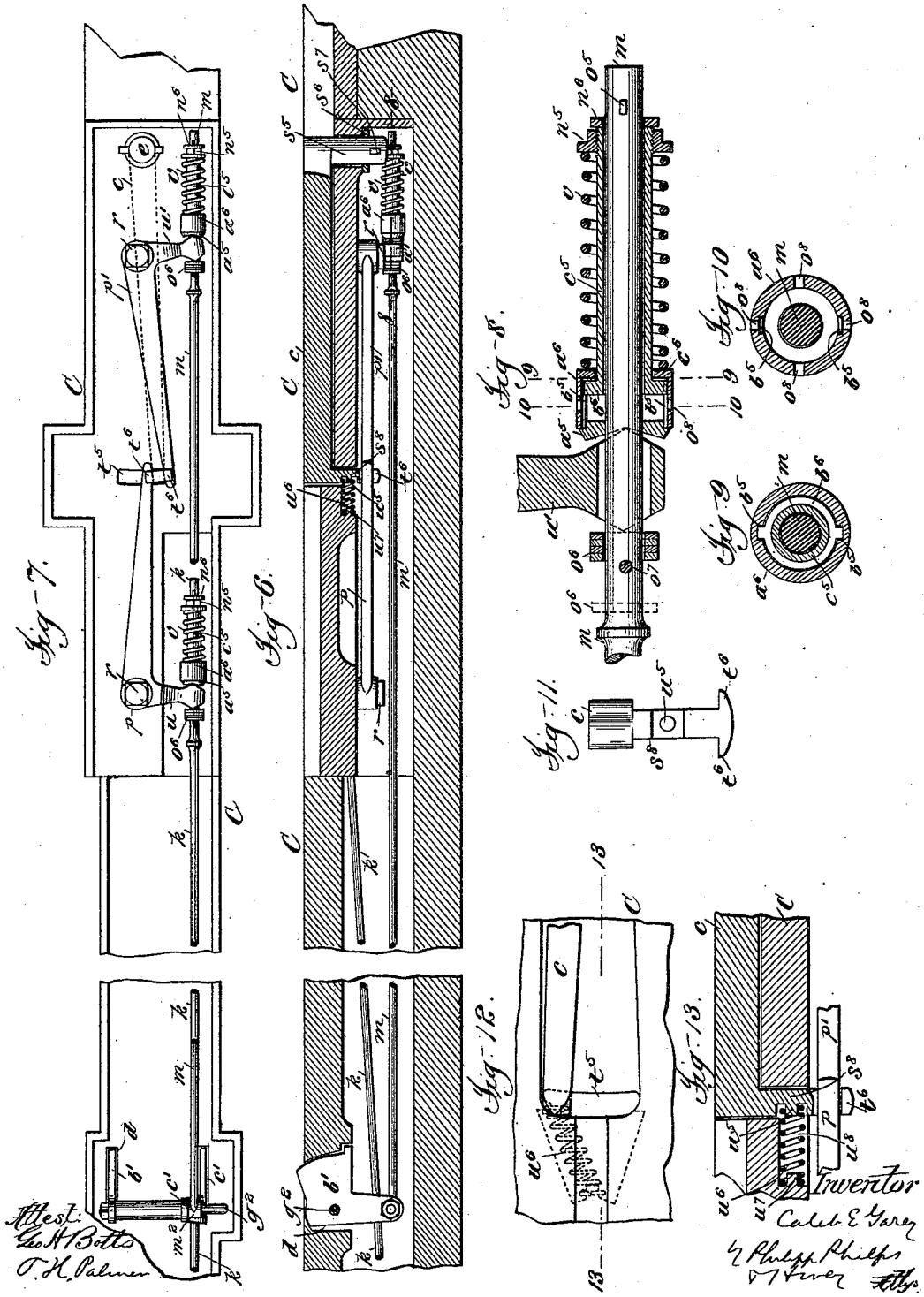
(No Model.) 6 Sheets—Sheet 3.

# C. E. GAREY.

## RAILWAY SWITCH.

No. 473,387. Patented Apr. 19, 1892.



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# C. E. GAREY.

## RAILWAY SWITCH.

No. 473,387. Patented Apr. 19, 1892.

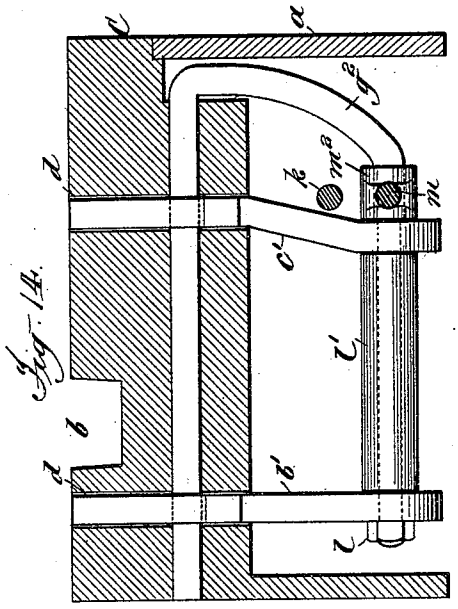

Fig. 14.

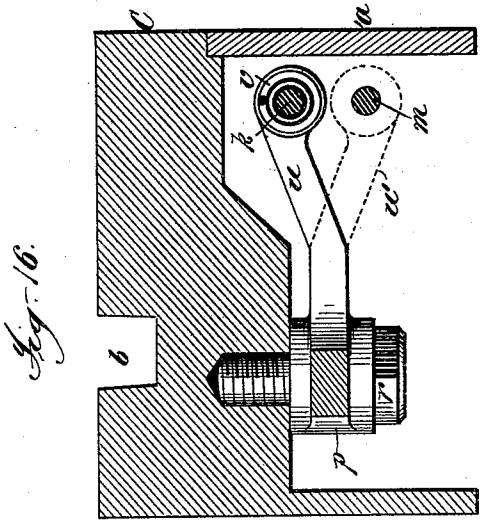

Fig. 16.

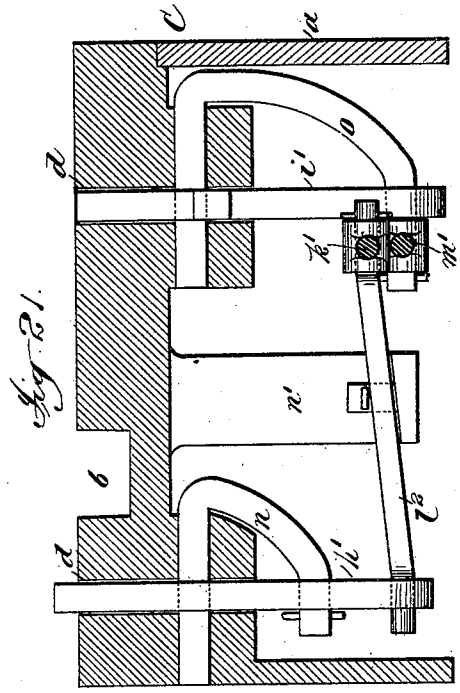

Fig. 21.

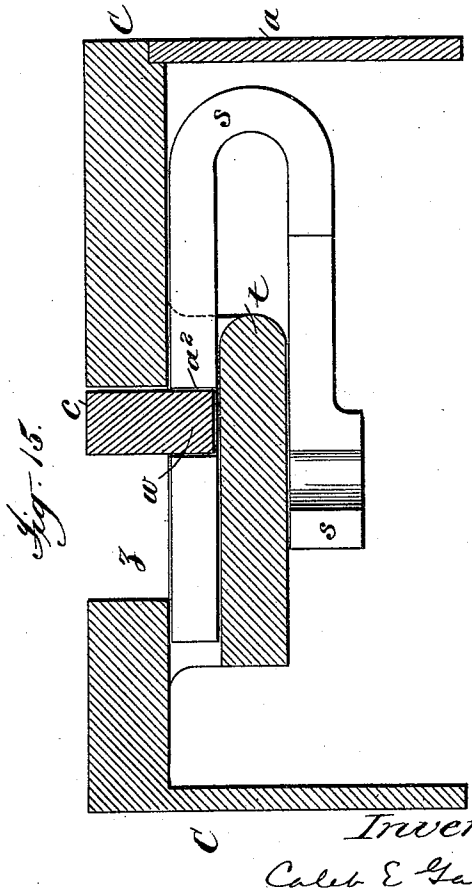

Fig. 15.

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(No Model.) 6 Sheets—Sheet 5.

# C. E. GAREY.

## RAILWAY SWITCH.

No. 473,387. Patented Apr. 19, 1892.

Fig. 17.

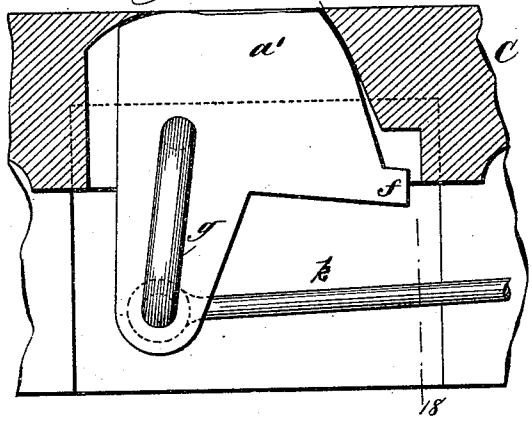



Fig. 18.

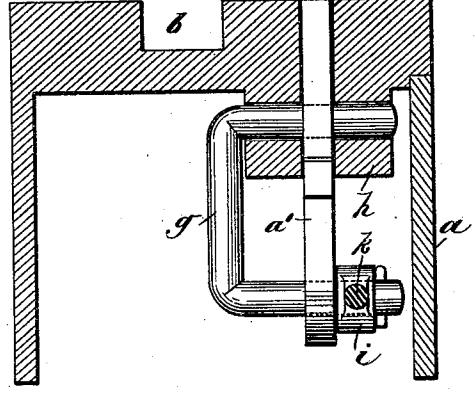



Fig. 19.

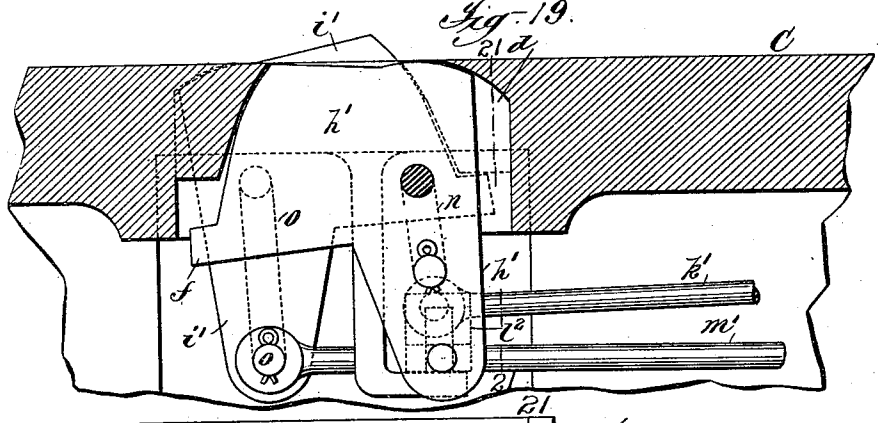
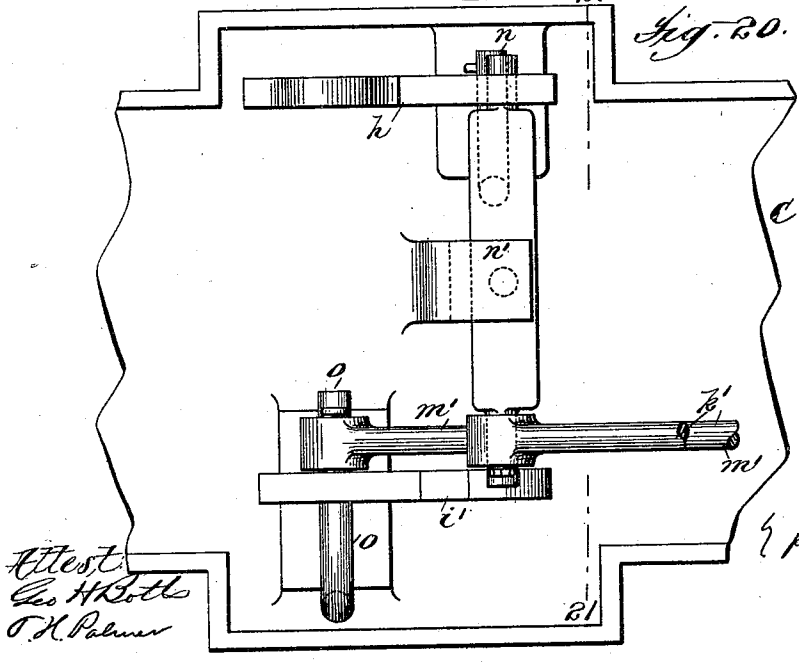



Fig. 20.




Witnesses:
Geo. H. Bottle
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(No Model.) 6 Sheets—Sheet 6.

# C. E. GAREY.

## RAILWAY SWITCH.

No. 473,387. Patented Apr. 19, 1892.

Fig. 22.

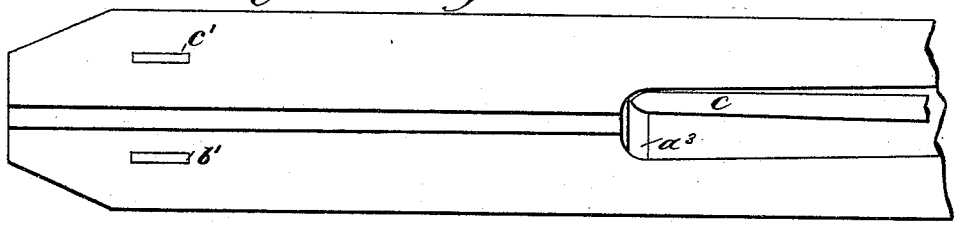



Fig. 23.

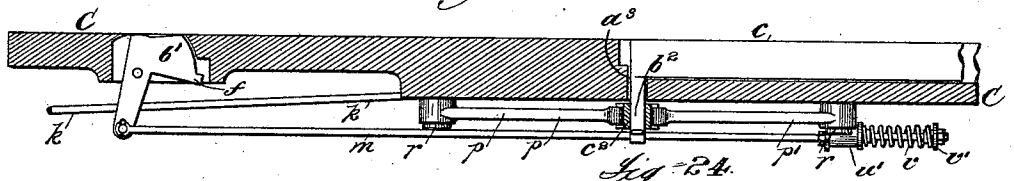



Fig. 24.


Fig. 25.

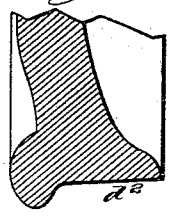



Fig. 26.

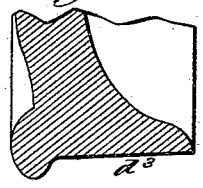



Fig. 27.

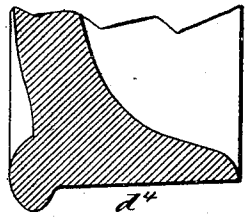



Fig. 28.

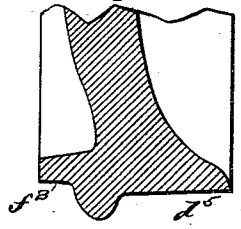
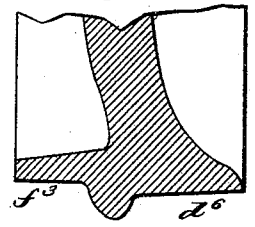



Fig. 29.




Attest:
Geo. H. Potts.
T. H. Palmer

Inventor.
Caleb E. Garey
by Philipp Philipp & Hurley
Attys

# UNITED STATES PATENT OFFICE.

CALEB E. GAREY, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO WILLIAM WHITE, OF SAME PLACE.

## RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 473,387, dated April 19, 1892.

Application filed May 15, 1890. Serial No. 351,858. (No model.)

*To all whom it may concern:*

Be it known that I, CALEB E. GAREY, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Railway-Switches, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that type of railway-switches adapted to be operated by the car-wheels independently of any special mechanism carried by or attached to the car.

While the invention is primarily intended for street-railways, it may also be employed for steam-railways.

The general object of the invention is to devise an automatic switch system so organized that cars of different lines traveling certain distances on the main line shall be automatically switched at the proper points from the main line onto their respective branch lines, the switches being controlled by the wheels of the cars, which are formed with different treads for this purpose.

A further object is to provide a switch system of this class in which the switches shall be automatically set for either the main or branch way by all cars passing it, so that the proper switching of the car is insured independently of the direction of the preceding car or of any change of the switch by accident or otherwise.

A further object is to provide a simple and efficient construction of switch mechanism especially adapted for the embodiment of my invention and to improve the construction of mechanism for use in railway-switches, whether operating on the system forming the chief feature of my invention or not.

The invention and its manner of operation are hereinafter described, and the features of novelty for which Letters Patent are desired are set out in the claims at the end hereof.

In the accompanying drawings, which form part of this specification and in which like parts are indicated by like letters of reference in the several views, Figure 1 is a plan view of a railway-track, showing the arrangement of the several switches in my system. Fig. 2 is a top plan view of a portion of Fig. 1. Fig. 3 is a longitudinal sectional view on line 3 3 of Fig. 2. Fig. 4 is a similar view, on an enlarged scale, of a portion of Fig. 3. Fig. 5 is a bottom plan view of Fig. 4. Fig. 6 is a longitudinal sectional view similar to Fig. 4, but showing means whereby the tension of the springs on the operating-rods may be adjusted independently of the switch-tongue and its operating-levers. Fig. 7 is a bottom plan view of Fig. 6. Fig. 8 is an enlarged section on line 8 of Fig. 6. Fig. 9 is a cross-section on line 9 of Fig. 8. Fig. 10 is a cross-section on line 10 of Fig. 8. Fig. 11 is a front end view of the switch-tongue shown in Fig. 6. Fig. 12 is a fragment of the hollow structure upon which the switch-tongue is supported and of the front end of the switch-tongue shown in Fig. 6. Fig. 13 is a longitudinal section on the line 13 of Fig. 12. Fig. 14 is a cross-section on line 14 of Fig. 4. Fig. 15 is a cross-section on the line 15 of Fig. 4. Fig. 16 is a cross-section on the line 16 of Figs. 4 and 5. Fig. 17 is a detail sectional enlargement of a portion of Fig. 3. Fig. 18 is a section on the line 18 of Fig. 17. Fig. 19 is a partly-sectional view illustrating a mode of supporting a pair of switch-keys and securing the operating-rods thereto when the purpose is to have the pair of keys alternate in rising above and being depressed to the surface of the track. Fig. 20 is a bottom plan view of Fig. 19. Fig. 21 is a section on the line 21 of Figs. 19 and 20. Fig. 22 is a top plan view showing a modified construction of switch-tongue. Fig. 23 is a longitudinal section of Fig. 22. Fig. 24 is a detail of a part of Fig. 23, and Figs. 25, 26, 27, 28, and 29 are fragmentary sectional views showing various forms of car-wheels.

The plan view of Fig. 1 shows two switch-tongues and a series of switch-keys arranged according to my system. The key marked $a'$ in this view is shown in detail in Figs. 17 and 18. Those marked $b'$ $c'$, $d'$ $e'$, and $f'$ $g'$ are of that construction shown in Fig. 14, and those marked $h'$ $i'$ are illustrated in Figs. 19, 20, and 21.

The main way is indicated by A, and the branch ways by B B'.

The switch mechanism is supported in and upon the structure C, which is arranged to form a component part of the way, being prac-

tically rails of the way. The structure C is chambered, as shown in the sectional views, to receive the operating mechanism of the switch, which is arranged therein longitudinally of the rails. This disposition of the mechanism avoids the necessity of making trenches transversely of the track for the accommodation of the levers and other parts of the switch, which, aside from the trouble and expense involved, does not afford as good a protection to the mechanism as the plan which I employ.

The structure C may be made in sections of convenient lengths to facilitate handling and placing the same in position, and one of its sides, as *a*, preferably on the outside of the way, may be made removable, so that the operating mechanism may be conveniently reached when required without disturbing the road-bed or interfering with traffic over the way. The described location of the switch mechanism longitudinally of the way within the hollow structure C, forming a part of one rail of the way, brings said mechanism, as will be seen, wholly on one side of the track. This is an important feature of my invention. The rails of the way are preferably grooved to accommodate the flange of the car-wheels, as at *b*. The switch-keys are pivoted within the hollow structure C, so as to project within the openings *d* for co-operation with the car-wheels.

The switch-tongue is indicated by *c*, and in Fig. 3 it is pivoted at its rear end within a depression in the top of its support by bolt *e*, as shown, and its forward end is adapted to be thrown by the operating mechanism, presently described, to switch the car onto the branch or main way, as required.

In Fig. 6 the switch-tongue *c* is turned downward at its rear end, as indicated by $s^5$, said part $s^5$ passing through an opening in the tongue-support and serving as the pivot on which the tongue swings. A washer $s^6$ on the bent part $s^5$, held in place by pin $s^7$, prevents the rear end of the tongue from being displaced.

The switch-keys are pivotally supported within the openings *d* of hollow structure C in such manner that when the lower ends of said keys are moved in one direction their upper ends will protrude from the openings *d*, and when moved in an opposite direction their upper ends will be depressed to the surface of the rail. The preferred shape of the switch-key is that shown in Figs. 4, 17, and 19. To limit the upward movement of the key, it is provided with a lip or projection *f*, adapted to abut against an offset on the casing C, as shown in Fig. 17.

The mode of supporting the switch-keys employed in my system will now be described, in connection with their co-operating elements.

The key $a'$ in Fig. 17 (shown at the extreme left hand of Fig. 3) is pivotally supported, as seen in Fig. 18, which is a section at right angles to Fig. 17. After being placed in the opening *d* a staple-like hinge *g* has one of its arms passed through an opening in lug *h* and through an opening in the key, which latter opening when assembling the parts is brought coincident with the opening in lug *h* when the top edge of the key is substantially flush with the outer surface of casing C, the other arm of hinge *g* passing through an opening at the lower end of the key and receiving the coupling *i*, by means of which the end of the operating-rod *k* is flexibly jointed thereto. When the rod *k* is drawn to the right, the key connected thereto swings to the position occupied by the key $b'$. (Shown in Fig. 4.)

The keys $b'$ $c'$ in Fig. 14 are connected to swing together by a staple-like hinge $g^2$, having a long arm passing through an opening in a lug in casing C and coincident openings in the keys and a shorter arm passing through the keys $b'$ $c'$ and provided at its extremity with a nut *l*. A sleeve $l'$ is placed on the shorter arm between the keys $b'$ $c'$ to keep said keys in position. The operating-rod *m* is flexibly connected to $g^2$ by an encircling collar $m^2$, as shown. The key $c'$ is bent from a vertical line, as shown in Fig. 14, to permit the rod *k* to pass said key. The keys $b'$ $c'$ being coupled together of course move together. When the rod *m* is pulled to the right, it elevates the keys $b'$ $c'$, and when pulled to the left said keys are depressed.

In Figs. 19, 20, and 21 I show the manner in which a pair of keys are so pivoted that when one is elevated the other will be depressed, and vice versa. In these views the keys $h'$ $i'$ are supported within the hollow casing C, so as to project into the openings *d* of said casing upon independent pivots *n o*, one of the arms of each pivoting device passing through lugs on the casing and the coincident holes in the keys and the other arms passing through the keys below said lugs. The end of that member of arm *o* which passes through the lower portion of key $i'$ has flexibly connected thereto one end of operating-rod $m'$. At the bottom of key $h'$ there is secured one end of lever $l^2$, which is fulcrumed on the bracket $n'$, and has flexibly connected at its opposite end one end of the operating-rod $k'$. To bring the operating-rods $k'$ $m'$ in substantially the same vertical line one above the other, in order to render it practicable to operatively connect the rods to the lever mechanism for operating the tongue, the lever $l^2$ is bent, as shown, so that its end which is not secured to the key $h'$ is immediately above that end of pivoting device *o* to which the rod $m'$ is connected. That surface of bracket $n'$ upon which lever $l'$ is fulcrumed is inclined to correspond with the inclination of the said lever, as shown in Fig. 21. When the rod $m'$ is drawn forward or to the right, the key $i'$ will assume the position shown in Fig. 19, with its upper end projecting above the way, while the key $h'$ assumes position with its upper surface level with the surface of the

way, and by reversing the movement of rod $m'$ by pressure on the upper exposed end of key $i'$ the rod $k'$ will move in an opposite direction and through the lever connection $l^2$ elevate the key $h'$ above the surface of the way, at the same time maintaining the key $i'$ at the surface of the way. It will thus be seen that the keys $i'$ $h'$ are alternately elevated and depressed as the rods $m'$ $k'$ alternately move forward and backward.

In describing the lever mechanism by which the switch-tongue is shifted I make no mention of operating-rods $k'$ $m'$; but it will be understood that these rods are the same as rods $k$ $m$. Their mode of connection with the switch-keys $h'$ $i'$ is, however, different, as above explained.

The operating-rods $k$ $m$ (see Figs. 3, 4, and 5) connect with the bell-crank levers $p$ $p'$, located within that part of structure C immediately beneath the switch-tongue $c$. The levers $p$ $p'$ are fulcrumed to the inner top surface of structure C on screw-bolts $r$, Fig. 16. In the construction shown in Figs. 4 and 5 the long arms of levers $p$ $p'$ take into recesses in the sides of the yoke $s$, which is arranged to embrace and slide upon the bracket $t$, Fig. 15, while through the extremities of their short arms $u$ $u'$ pass the rods $k$ $m$, which rods are provided at their ends with stiff coiled springs $v$. In these views (4 and 5) the springs $v$ are adjusted upon the collars $v'$ and are kept on the rods by nuts $w$, the function of the springs $v$ being to maintain the keys in the position to which they may be adjusted or placed when operated upon by the car-wheels. There is no pressure exerted by the springs $v$ on the short arms $u$ $u'$ of the bell-crank levers, and the rigidity of said springs is such that they do not yield when the switch is operated unless the switch-tongue should be obstructed from any cause. By placing the screw-nuts $w^2$ on the rods on the opposite sides of the lever-arms $u$ $u'$ from the springs the action will be rendered positive and the wear of parts may be taken up by adjusting the length of the rods by means of the nuts $w$ at the ends of the rods outside the springs and said screw-nuts $w^2$.

To allow of the adjustment of the tension of the springs $v$ independently of the switch-tongue and its operating-levers is the purpose of the construction shown in Figs. 6 to 10. In these views the operating-rod $m$ (the rod $k$ being correspondingly equipped) is provided with a collar $a^5$, over which is adjusted the collar $a^6$, having internal longitudinal grooves $b^5$. Within collar $a^6$ the flange $b^6$ of sleeve $c^5$ is adapted to slide, the said flange having longitudinal guide-ribs which fit in the grooves $b^5$ of collar $a^6$. The collar $a^6$ is also provided with a flange $c^6$, which prevents the longitudinal separation of these parts. Upon the sleeve $c^5$ is adjusted the spring $v$, which is held against the flange $c^6$ of collar $a^6$ by means of the adjusting-nut $n^5$ on the screw-threaded end of sleeve $c^5$. The washer $n^6$, fixed over the end of the operating-rod $m$ and held in place by pin $o^5$, prevents the sleeve $c^5$ from slipping off said rod. The short arm $u'$ of the bell-crank lever, through which the operating-rod $m$ passes and which is in contact with the face of collar $a^5$, as shown, is held in proper longitudinal adjustment on the rod $m$ by the washers $o^6$, placed on said rod and in contact with pin $o^7$. It is of course understood that the position and throw of the tongue is determined by the fixed position of the short arm $u'$ on the operating-rod $m$. To adjust the arm $u'$ farther to the left to adjust the parts, the pin $o^7$ is removed and one or more of the washers $o^6$ are moved to the position of the washer shown in dotted lines and the pin $o^7$ replaced. The sleeve and spring $c^5$ $v$, with the described collars, are then moved up on rod $m$, carrying the lever-arm $u'$ to the left in contact with washers $o^6$, in which new position it is fixed by the insertion of one or more additional washers $n^6$ in front of the removable pin $o^5$. By increasing the number of washers $o^6$ and decreasing the number of washers $n^6$ employed the lever-arm $u'$ may be shifted to the right, and thus the switch be adjusted in either direction. The wear of the parts, also, may be perfectly compensated for by the addition of washers, and thus the proper action of the mechanism assured.

By the construction and arrangement of the parts described the ordinary action of the levers when moved by the operating-rods, as they are affected by the depression of the switch-keys, have no appreciable effect on springs $v$, they being of sufficient strength to support without yielding the pressure required for moving the tongue; but if the switch-tongue should be obstructed from any cause the pull on the rod will force the flange $b^6$ of sleeve $c^5$ into collar $a^6$ with the effect of compressing spring $v$, which will relax as said flange $b^6$ resumes its normal position, which will be the case as soon as the pull on the operating-rod ceases. In adjusting the tension of spring $v$, which is done without affecting the switch-tongue or operating-levers, the nut $n^5$ is screwed forward or backward, as may be required, on the sleeve $c^5$, in doing which the sleeve and its co-operating collars are prevented from turning by a rod held in one of the openings $o^8$ in the collar $a^6$.

In the construction of Figs. 4 and 5 the switch-tongue $c$ is provided with a lip $w'$ and a groove $x$. The groove $x$ co-operates with projection $y$ on the surface of the switch-support to assist in guiding the end of the tongue $c$ when shifted, and the lip $w'$ enters the opening $z$, also in the switch-support, and an opening $a^2$ in yoke $s$, thereby connecting the switch-tongue $c$ and yoke $s$, so that as the yoke is moved by the bell-crank levers $p$ $p'$, acted upon by rods $k$ $m$, the switch-tongue $c$ is shifted accordingly. The parts just described are best shown in Fig. 4 and 15.

In lieu of the above construction that con-

nection between the switch-tongue and levers shown in Figs. 22 and 23 may be employed. In these views the switch-tongue $c$ is shown provided at its front end with a downwardly-projection member $b^2$, square in cross-section, which is adapted to enter the slot $a^3$, made in the support for the switch-tongue, and pass through the square opening in block $c^2$, in the recesses in the sides of which block the ends of the long arms of the bell-crank levers $p\ p'$ fit. In the operation of the switch the block $c^2$ is thrown by the levers $p\ p'$, thus shifting the switch-tongue in an obvious manner.

In lieu of either of the above constructions the switch-tongue $c$ may be made and connected with the operating-levers, as illustrated in Figs. 6, 7, 11, 12, and 13, which show the preferred mode of making and connecting these features of my invention. Referring to these views, the switch-tongue $c$, supported within a depression in the top of the hollow structure C, is bent downward at front and back, as seen at $s^8$ and $s^5$, the bent part $s^5$ passing through an opening in the tongue-support and serving as a post, on which the tongue swings, as hereinbefore stated. The bent part $s^8$ at the front of the tongue $c$ projects through opening $t^5$, within which it swings, and at its end is provided with the lateral extensions $t^6$, which support the ends of the long arms of the bell-crank levers. The bent part $s^8$ is provided on its front with a lug $u^5$, to which is connected one end of a spring $u^6$, the other end whereof is secured over lug $u^7$, formed within recess $u^8$, immediately in front of the opening within which said bent part $s^8$ swings. This spring $u^6$ is of such length and rigidity that as the tongue $c$ moves toward the center of the opening in which its bent part $s^8$ is adapted to swing the spring is compressed, and as it passes said central point it expands, and thus assists in throwing the tongue to the position to which it is being shifted. By this means the rebound of the tongue as it strikes the side of the structure C is prevented and the tongue held in the position to which it has been shifted, avoiding all danger of accidental displacement. This spring may be used with any other of the constructions shown herein, and is of general application in switches in all cases in which a shifting tongue is used.

Figs. 25 to 29 show fragmentary sectional views of car-wheels, Fig. 25 showing a narrow tread $d^2$, Fig. 26 a medium tread $d^3$, 27 a wide tread $d^4$, 28 a narrow tread $d^5$ and narrow flange $f^2$, and 29 a narrow tread $d^6$ and wide flange $f^3$.

As before stated, Fig. 1 of the drawings illustrates the application of my invention to a railway-switch system, the keys being arranged at varying distances from the groove of the rail. Referring to this view, the switch-key $a'$ (see Figs. 17 and 18) is connected to throw the tongue for the curve B, and wheels having a narrow tread, Fig. 25, will take the curve at the first switch. The keys $b'\ c'$ (see Fig. 14) are connected together and throw the tongue for the main way and are operated by any of the wheels except the narrow-tread wheel of Fig. 25, so that all cars keep the main track at the first switch except those having narrow-tread wheels. The keys $d'\ e'$ are also connected together, Fig. 14, and throw the tongue for the second curve B'. Cars with wheels having a medium tread, Fig. 26, or a narrow flange, Fig. 28, will take the curve at this switch. The keys $f'\ g'$ are also connected together, Fig. 14, and throw the tongue for the main way. These keys are operated by wide-tread or wide-flange wheels, and cars thus equipped keep the main way, though shifting and reshifting the switch. The keys $h'\ i'$ throw the tongue for the main way and branch, respectively, or vice versa, the construction of key mechanism shown in Figs. 19, 20, and 21 being used. Hence cars having wheels with wide treads, Fig. 27, and those with wide flanges, Fig. 29, will diverge at this point, the former, for example, depressing key $h'$, which may connect with the operating-rod, shifting the switch-tongue onto the curve and setting the key $i'$, (which, as seen in Fig. 21, is elevated as key $h'$ is depressed,) which will be operated by the wide-flange wheels to set the switch for the main way, in doing which it elevates the key of the curve.

It is evident that in my system the keys and switch-tongue must be so located and arranged relatively to each other and to the car-wheels that of the two or more keys operating the same switch the second key or keys, which are operated by the wider treads or flanges, must be operated in season to permit the car to take the switch as thus set, and that the first or narrow-tread key must not be operated after the second key. This object may be attained by either operating the second keys only by the rear wheels of the car and placing these keys at a distance from the switch-tongue point greater than the distance between the front and rear wheels of the car or by operating the keys by the front wheels and placing the first and second keys at a corresponding distance apart, in which case the distance between the second keys and the switch-tongue may be less. I prefer the latter plan, as I am thus enabled to construct the front and rear wheels of a car so that both will operate in the same manner and the switch may be properly set, even though the cars be reversed.

The system is shown as applied with the first keys throwing the switch for the branch way; but it is obvious that the system may readily be arranged so that these keys throw the switch for the main way and the second keys for the branch ways.

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

1. In a railway-switch system, the combination, with a switch-tongue and its operating mechanism, of a switch-key throwing the switch in one direction and a second switch-

key located between said key and the switch-tongue and throwing the switch in the opposite direction, said switch-keys being operated by the car-wheels and located in different positions transversely to the rail, so that the second key is operated only by car-wheels having treads or flanges of greater width than required to operate the first key, and said keys and tongue being so located relatively to each other and to the car-wheels that a car may set the switch by the first key and reset the switch for itself by the second key, substantially as described.

2. In a railway-switch system, the combination, with a switch-tongue and its operating mechanism, of a switch-key throwing the switch in one direction and two switch-keys located between said key and the switch-tongue and throwing the switch in the opposite direction, said switch-keys being operated by the car-wheels, and the last-mentioned keys being located in position to be operated by car-wheels having, respectively, treads or flanges of greater width than required to operate the first-mentioned key, and said keys and tongue being so located relatively to each other and to the car-wheels that a car may set the switch by the first key and reset the switch for itself by one of the last-mentioned keys, substantially as described.

3. In a railway-switch system, the combination, with the main way, series of branch ways, and switch-tongues and operating mechanism, of switch-keys throwing successive switches in the same direction, and switch-keys located between said keys and their respective switches and throwing the latter in the opposite direction, said switch-keys being operated by the car-wheels and located in different positions transversely to the rail, so that the last-mentioned keys are operated only by wheels having treads or flanges of greater width than required to operate the first-mentioned keys for the corresponding switches, and said keys and tongue being so located relatively to each other and to the car-wheels that a car may set each of the switches by the first-mentioned keys and reset the switches for itself by the last-mentioned keys, substantially as described.

4. In a railway-switch system, the combination, with a switch-tongue and its operating mechanism, of a switch-key throwing the switch for the branch way and a second switch-key located between the branch-way key and the switch-tongue and throwing the switch for the main way, said switch-keys being operated by the car-wheels and located in different positions transversely to the rail, so that the main-way key is operated only by car-wheels having treads or flanges of greater width than required to operate the branch-way key, and said keys and tongue being so located relatively to each other and to the car-wheels that a car may set the switch by the branch-way key and reset the switch for itself by the main-way key, substantially as described.

5. In a railway-switch system, the combination, with a switch-tongue and its operating mechanism, of a switch-key throwing the switch for the branch way and two switch-keys located between the branch-way key and the switch-tongue and throwing the switch for the main way, said switch-keys being operated by the car-wheels and the main-way keys being located in position to be operated by car-wheels having, respectively, treads or flanges of greater width than required to operate the branch-way key, and said keys and tongue being so located relatively to each other and to the car-wheels that a car may set the switch by the branch-way key and reset the switch for itself by one of the main-way keys, substantially as described.

6. In a railway-switch system, the combination, with the main way, series of branch ways, and switch-tongues and operating mechanism, of switch-keys throwing the successive switches for the branch ways, and switch-keys located between said branch-way keys and their respective switches and throwing the latter for the main way, said switch-keys being operated by the car-wheels and located in different positions transversely to the rail, so that the main-way keys are operated only by wheels having treads or flanges of greater width than required to operate the branch-way keys for the corresponding switches, and the branch and main way keys for the successive switches are operated only by car-wheels having treads or flanges of greater width than required to operate the keys for preceding switches, and said keys and tongue being so located relatively to each other and to the car-wheels that a car may set the switches by the branch-way keys and reset the switches for itself by the main-way keys, substantially as described.

7. A railway-switch system comprising a main way and series of branch ways, switch-tongues and operating mechanism, and switch-keys operated by the car-wheels and arranged in different positions transversely to the rail, whereby they are adapted to be operated by car-wheels having treads or flanges of different widths, the switch-keys being single or combined in pairs on opposite sides of the rail, and keys of the same pair being constructed to throw the switch in the same direction or in opposite directions, according to the location of the switch controlled thereby, substantially as described.

8. In a railway-switch system, the combination, with the rails, switches, and switch-keys operated by the car-wheels, of cars provided with wheels having treads of different widths for operating said switch-keys, said switch-keys and wheels being so constructed and arranged relatively to each other that each switch is set in one direction by the wheels of all cars passing the switch and in the oppo-

site direction only by the wheels of certain cars, substantially as described.

9. The combination, with a railway-switch tongue and its operating mechanism, of a switch-key throwing the tongue in one direction and operated by the car-wheels, and a second switch-key located between said key and the switch-tongue and throwing the tongue in the opposite direction, said key being arranged to be operated only by the wheels of a portion of the cars operating the first key, substantially as described.

10. The combination, with a railway-switch tongue and its operating mechanism, of a switch-key throwing the tongue in one direction and operated by the wheels of all cars passing it, and a second switch-key located between said key and the switch-tongue and throwing the switch in the opposite direction, said key being arranged to be operated only by the wheels of certain cars, substantially as described.

11. In a railway-switch, a hollow structure underlying one of the rails and provided with a removable side, in combination with a switch mechanism located within said hollow structure, substantially as described.

12. In a railway-switch, the combination of a switch-tongue, a hollow structure underlying one of the rails in front of the heel of the tongue, a pair of pivoted bell-crank levers within said structure, having long arms connected to the tongue in front of its heel and arranged to throw the tongue in opposite directions, switch-keys pivoted in switch-key openings and operated by the car-wheels, and rods connecting the switch-keys and short arms of the bell-crank levers and moving longitudinally of the rail within said hollow structure, substantially as described.

13. In a railway-switch, the combination of a swinging switch-tongue bent downwardly at its heel to form a pivoting-post and likewise bent downwardly at its front end, a plate forming a part of the way and recessed on top to receive the tongue, said plate being provided with a round hole to receive the pivoting-post and a slot to receive the downward projection at the front end of the tongue, a hollow structure underlying the rail in front of the heel of the tongue, and a pair of bell-crank levers within said hollow structure, having long arms connected to the downward extension at the front end of the tongue and arranged to throw the tongue in opposite directions, and switch-keys and connections for operating said bell-crank levers, substantially as described.

14. The combination, with the hollow structure C and switch-tongue *c*, pivoted at one end to shift within a depression in the top surface of structure C and provided at its other end with a depending part operating in an opening in said structure, of a pair of bell-crank levers fulcrumed within hollow structure C and operatively connected to said depending part of the switch-tongue, and a pair of rods coupled to switch-keys and having their opposite ends secured to the lever-arms *u u'*, substantially as described.

15. The combination, with the hollow structure C and pivoted switch-tongue *c*, having a depending part at its front end, of a pair of bell-crank levers fulcrumed within structure C and operatively connected to said depending part of the switch-tongue, and a pair of spring-equipped rods operatively connecting the bell-crank levers and switch-keys together, and means for adjusting the length of said rods to take up the wear of the parts, substantially as described.

16. The combination, with a pivoted switch-tongue, of a pair of bell-crank levers having one of their arms connected to the tongue on one side of its pivot and shifting said tongue in opposite directions, and operating mechanism connected with the other arms of said bell-crank levers, substantially as described.

17. The combination, with a pivoted switch-tongue having a downward projection, of a pair of horizontally-moving bell-crank levers engaging the downward projection on opposite sides, and switch-keys and connections for operating said bell-crank levers, substantially as described.

18. The combination, with a pivoted switch-tongue, of a pair of horizontally-moving bell-crank levers having one of their arms connected to the tongue on one side of the pivot, and switch-keys and operating connections connected with the other arms of said bell-crank levers, said levers being reversely arranged, so that the movement of the respective switch-keys in the same direction throws the switch in opposite directions, substantially as described.

19. The combination, with a pivoted switch-tongue and its operating mechanism, of a coiled spring, the opposite ends of which are seated on beveled points facing each other and placed at a sufficient distance apart to receive the spring under compression, one of said points being stationary and the other movable with the tongue, whereby the tongue is subjected to a sidewise pressure from the spring as the movable point carries one end of said spring back and forth past the other point in the operation of the switch mechanism, substantially as described.

20. The combination, with a switch-support and pivoted switch-tongue, of a spring engaging the switch-tongue and switch-support and under greatest tension when the switch-tongue is in a central position, substantially as described.

21. The combination, with a switch-support C and pivoted switch-tongue *c*, provided with a downwardly-projecting part, of a spring compressed between the downwardly-projecting part of said tongue and the switch-support and under greatest tension when the switch-tongue is in its central position, substantially as described.

22. The combination, with the operating-

rods of the switch mechanism, of flanged sleeves adjustable on the rods, collars within which the sleeves are adapted to slide and through which pressure is transmitted to the tongue, springs encircling said sleeves and pressing against the collars, and nuts for adjusting the tension of the springs, substantially as described.

23. The combination, with the operating-rod provided with adjustable washers, as $n^6$ $o^6$, of a sleeve and collar adjustable on said rod and an operating-lever connected to the switch-tongue and having an arm connected to the operating-rod between the washers $o^6$ and the head of said collar, whereby the position of said lever-arm on the rod and of the switch-tongue may be adjusted, substantially as described.

24. In a switch mechanism, the means for adjusting the tension of the springs carried by the operating-rods, the same consisting of a sleeve supporting the spring and provided with a flanged forward end, a collar-loose on said rod, a second collar adjusted over the first-named collar and having a flange coacting with the flange of the sleeve, as shown and described, and a nut on the screw-threaded rear end of said sleeve and adjustable thereon against the spring, the forward end of which spring abuts against the flange of the collar, substantially as described.

25. The combination, with the hollow structure C, provided with a key-slot and an interior lug, of a switch-key projecting into said slot and pivotally supported within structure C by a staple-like device, one arm of which passes through an opening in said lug and a coincident hole in the key and the other arm of which is connected to the lower end of the key, substantially as described.

26. The combination, with the hollow structure C, provided with switch-key slots and an interior lug, of a pair of switch-keys projecting into said slots and pivotally supported within structure C by a staple-like device passing through an opening in said lug and coincident holes in the keys and connected to the lower ends of said keys, so that they may move in unison, substantially as described.

27. The combination, with the hollow structure C, provided with switch-key slots and interior lugs, of a pair of switch-keys projecting into said slots and independently pivotally supported within the structure by staple-like devices passing through openings in said lugs and coincident holes in the keys and connected to the lower ends of the keys, a bracket depending between the keys, an operating-rod connected to one of the keys, a lever joined to the lower end of the other key and fulcrumed on the bracket and inclined so as to bring its end in the same vertical plane with said operating-rod, and an operating-rod connected to the end of the lever, whereby both rods are brought to the same side of the structure C, one above the other, and the keys are permitted to alternate in rising and falling, substantially as described.

28. The combination, with a switch-tongue, of switch-keys located in different positions transversely to the track, and operating connections between said keys and tongue, extending longitudinally of the track and lying in the same vertical plane, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CALEB E. GAREY.

Witnesses:
J. J. KENNEDY,
C. J. SAWYER.