

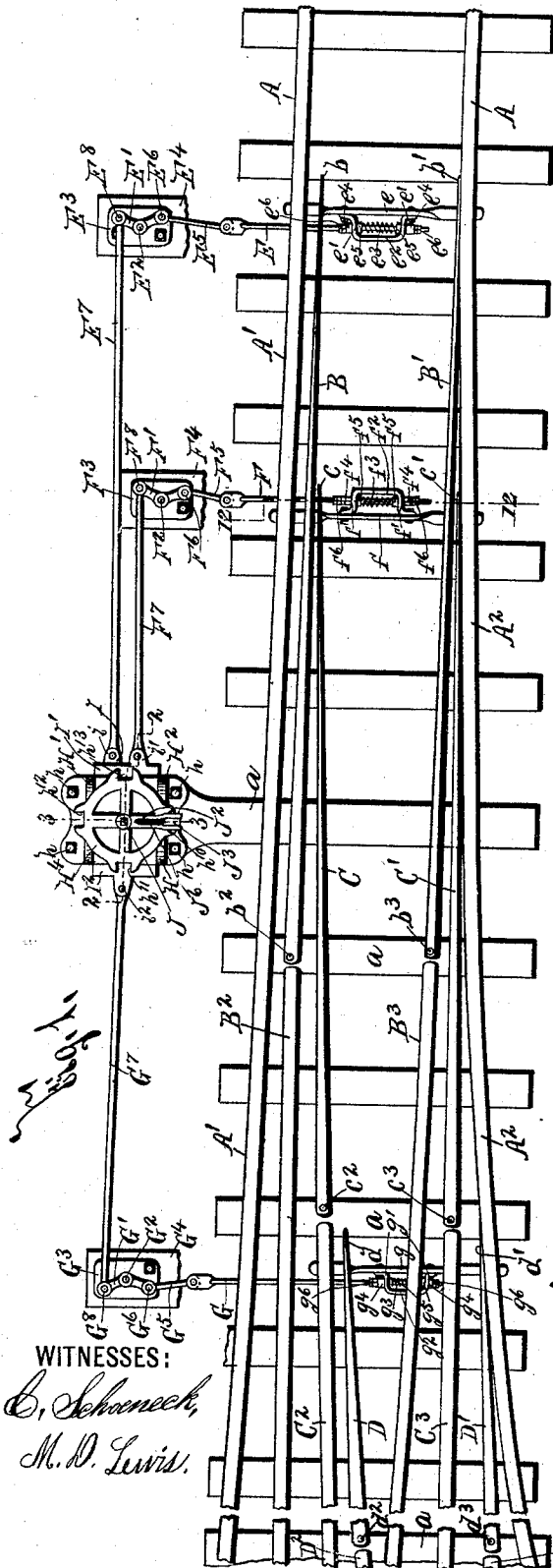
(No Model.)

G. HARGREAVES.
SWITCH.

2 Sheets—Sheet 1.

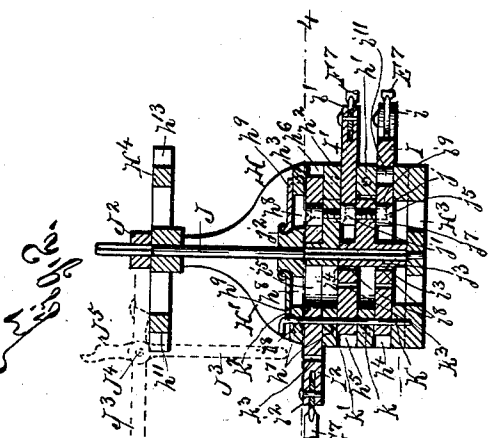
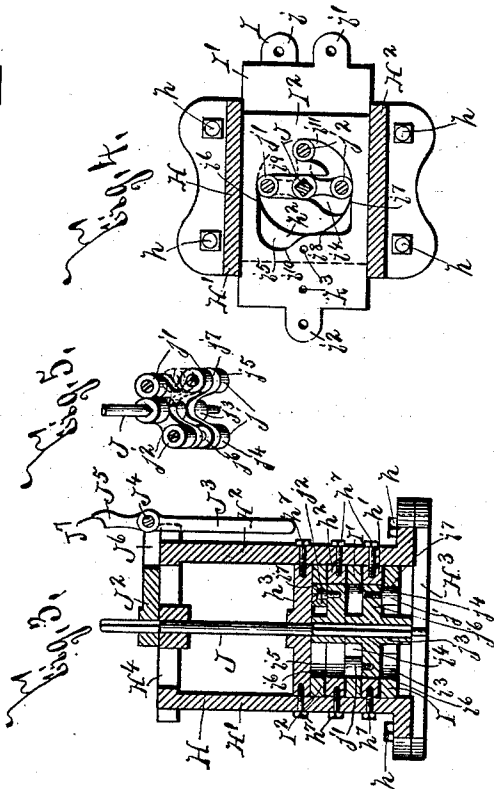
No. 509,896.

Patented Dec. 5, 1893.



WITNESSES:

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M. D. Lewis.



INVENTOR

George Hargreaves

BY

Henry W. Winsor & Parsons

ATTORNEYS,

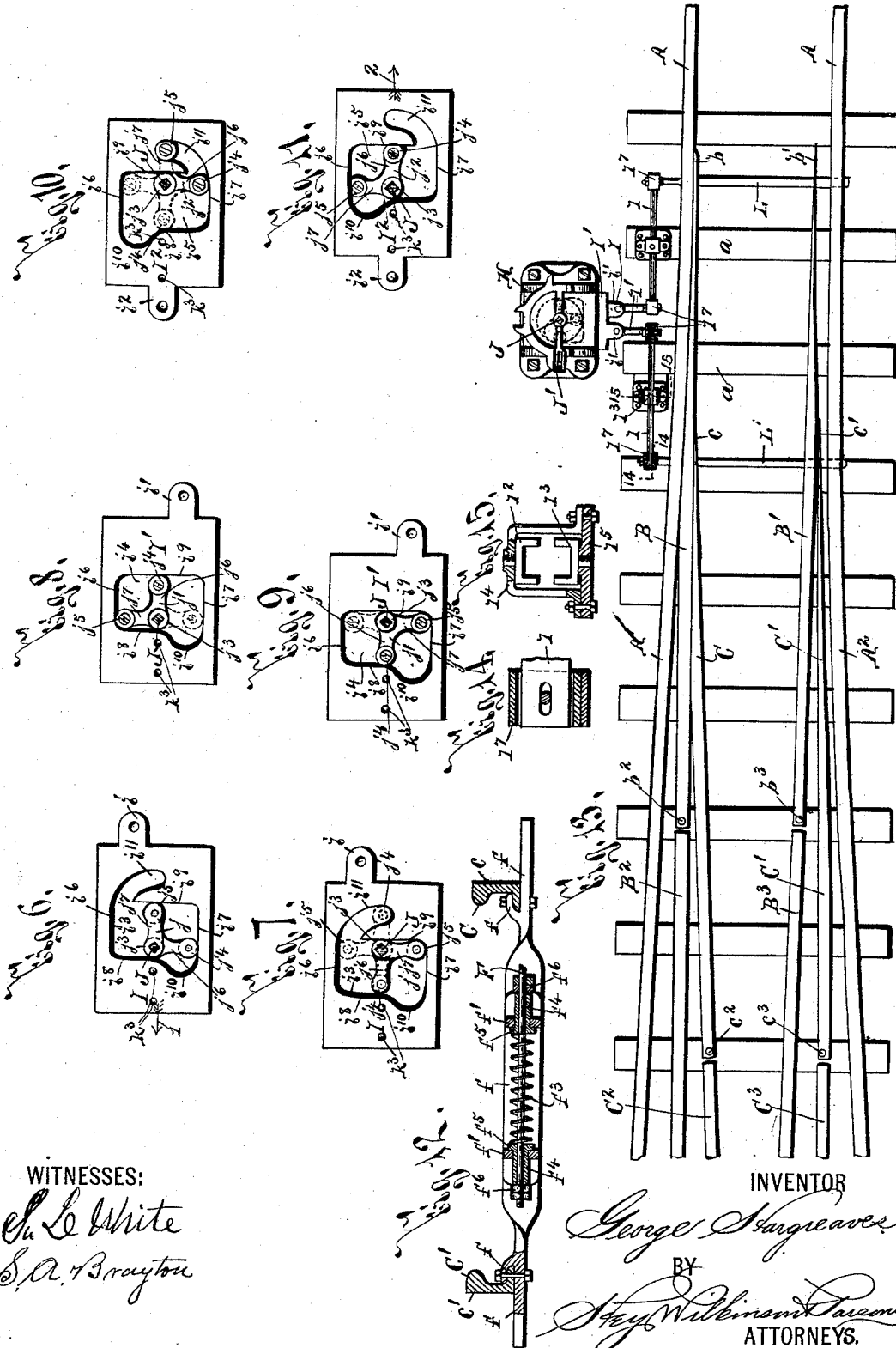
(No Model.)

2 Sheets—Sheet 2.

G. HARGREAVES.
SWITCH.

No. 509,896.

Patented Dec. 5, 1893.



WITNESSES:

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INVENTOR

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UNITED STATES PATENT OFFICE.

GEORGE HARGREAVES, OF SYRACUSE, NEW YORK.

SWITCH.

SPECIFICATION forming part of Letters Patent No. 509,896, dated December 5, 1893.

Application filed October 17, 1892. Serial No. 449,097. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HARGREAVES, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Switches, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in switches, and has for its object the production of a simple, practical, and effective device, which is economical in manufacture and durable in use; and to this end it consists, essentially, in the construction and arrangement of the parts, all as hereinafter more particularly described and pointed out in the claims.

In describing this invention, reference is had to the accompanying drawings, forming a part of this specification, in which like letters indicate corresponding parts in all the views.

Figure 1 is a top plan view of my improved invention, illustrating the general construction and arrangement of its parts. Figs. 2 and 3 are vertical sectional views, taken respectively on lines —2—2—, —3—3—, Fig. 1, for clearly illustrating the detail construction and arrangement of the standard or gate and the actuating plates or slides movable therein. Fig. 4 is a transverse horizontal sectional view, taken on line —4—4—, Fig. 2. Fig. 5 is an isometric perspective of the detached lower end of the actuating shaft of my improved switch, and its cams for illustrating the relative positions of said cams. Figs. 6 and 7 are detached plan views of the lower actuating plate or slide shown in its outer and inner positions and the actuating cam for moving said plate or slide. Figs. 8 and 9 are detached plan views of the intermediary actuating plate or slide shown in its outer and inner positions, and the actuating cam for moving said plate or slide. Figs. 10 and 11 are detached plan views of the upper actuating plate or slide shown in the same positions as the plates shown at Figs. 6 to 9 inclusive and the actuating cam for moving said plate or slide. Fig. 12 is a vertical sectional view, taken on line —12—12—, Fig. 1. Fig. 13 is a top plan view of a modified form of my invention, and Figs. 14 and 15 are trans-

verse vertical sectional views, taken respectively on lines —14—14— and —15—15—, Fig. 13.

—A—A— represent the main rails approaching the switch, which are curved outwardly at A'—A²— for forming the outside rails of the turnouts of the switch to opposite sides of the main track.

—B—B'— are tapering rail points having their corresponding extremities —b—b'— suitably shaped to fit in the usual manner against the inner faces of the main rails —A—A— and their opposite extremities hinged at —b²—b³— in any desired manner to a suitable support here shown as one of the timbers or cross-ties —a—.

—B²—B³— are ordinary rails, which form a continuation of the rail points —B—B'—.

—C—C'— are tapering rail points having their corresponding extremities —c—c'— suitably shaped to fit respectively against the inner face of the rail point —B— and against the outer face of the rail point —B'—, and having their opposite extremities hinged at —c²—c³— in any desired manner to a timber or cross-tie —a—.

—C²—C³— are ordinary rails, which form a continuation of the rail points —C—C'—.

—D—D'— are tapering rail points having their corresponding ends —d—d'— suitably shaped to fit respectively against the inner face of the rail —C²—, and the outer face of the rail —C³—, and having their opposite ends pivoted at —d²—d³— to a timber or cross-tie —a—, and —D²—D³— are ordinary rails forming a continuation of the rail points —D—D'—.

Upon reference to the drawings it will be understood that the rails —B²—C³— gage with each other, and form, essentially, a continuation of the main track —A—A—; that the rails —A'—B³— and —B²—C³— gage with each other and form turnouts in one direction from the main track; and that the rails —C²—D³— and —D²—A²— gage with each other and form turnouts in the opposite direction from the main track. These rails —A—A—, —A'—A²—, —B²—C²—, —D²—B³—, —C³—D³—, are secured to the timbers or cross-ties —a— by any desired form of securing means, not necessary to herein illustrate or describe, and it will also be readily understood that the

railor switch points —B—B'—, —C—C'—, and —D—D'— are guided in their movement by any desired construction of slide plates, not necessary to herein illustrate or describe.

5 —e—f— and —g— are movable cross bars having their opposite ends secured respectively to the free ends of the switch or rail points —B—B'—, —C—C'—, and —D—D'— for supporting said ends, and —E—F— and 10 —G— are connecting or bridle bars suitably connected at their corresponding ends to the respective cross-bars —e—f— and —g— for shifting the ends of the switch or rail points and governing the passage of the train.

15 —E'—F'— and —G'— are rocking levers pivoted respectively at —E²—F²— and —G²— to saddles —E³—F³— and —G³— mounted respectively upon suitable timbers or supports —E⁴—F⁴— and —G⁴—.

20 —E⁵—F⁵— and —G⁵— are links hinged respectively to arms —E⁶—F⁶— and —G⁶— of the levers —E'—F'— and —G'— and to the outer ends of the connecting or bridle bars —E—F—G—, and —E⁷—F⁷— and —G⁷— are 25 links hinged respectively to the opposite arms —E⁸—F⁸— and —G⁸— of said levers —E'—F'— and —G'— and to lugs —i—i'—i²— provided upon the actuating plates or slides —I—I'—I²— movable, as presently described, 30 in the gate or standard —H— of my improved switch.

As clearly seen at Figs. 1, 2, 4, 6, 7, 8, 9, 10, and 11, the lugs —i—i'— are arranged at the right-hand end edges of the plates or slides 35 —I—I'— and the lug —i²— at the left-hand end edge of the plate or slide —I²—.

The rail point-supporting cross-bars —e—f— and —g— are each formed with lugs —e'—e'—, —f'—f'—, and —g'—g'— connected respectively 40 by the short cross-bars —e²—f²— and —g²—.

—e³—f³— and —g³— are springs encircling the portions of the connecting or bridle bars —E—F— and —G— interposed between the 45 lugs —e'—e'—, —f'—f'—, and —g'—g'—.

—e⁴—e⁴—, —f⁴—f⁴—, —g⁴—g⁴— are sleeves movably guided respectively in the lugs —e'—e'—, —f'—f'—, —g'—g'— and formed 50 respectively on their inner ends with shoulders —e⁵—e⁵—, —f⁵—f⁵— and —g⁵—g⁵— interposed between the inner faces of the lugs —e'—e'—, —f'—f'—, —g'—g'— and the springs —e³—f³—g³—. Bearing against the outer ends of the sleeves —e⁴—e⁴—, —f⁴—f⁴—, 55 —g⁴—g⁴— are shoulders —e⁶—e⁶—, —f⁶—f⁶—, —g⁶—g⁶—, which are mounted respectively upon the connecting or bridle bars —E—F— and —G—.

The described construction of connection 60 between the connecting or bridle bars —E—F— and —G— and the cross-bars —e—f— and —g— is particularly simple and efficient, and permits a passing car traveling along the rails —A'—B³—, —B²—C³—, —C²—D³—, 65 —D²—A²— toward the main track —A—A to automatically shift any of the rail points —B—B'—, —C—C'—, —D—D'—, which are

not properly set to facilitate the passage of the car. It will be readily understood, however, that any other desired form of yielding 70 connection between said connecting or bridle bars —E—F— and —G— and the cross-bars —e—f— and —g— of the movable switch or rail points may be used instead of the described construction of said connections. 75

The levers —E'—F'—G'— and the links —E⁵—F⁵—G⁵—, and —E⁷—F⁷—G⁷— form a particularly simple and practical means of conveying motion from the actuating plates or slides —I—I'—I²— to the connecting or 80 bridle bars —E—F—G—, but it will also be understood that any other desired form of connection capable of practically transmitting the motion from said actuating plates or slides may be used if desired. 85

The standard or gate —H— of my improved invention is of any desirable form, size, and construction, and is placed in the usual manner at one side of the switch upon a projecting 90 end of one of the cross timbers or ties —a—. As preferably constructed the standard or gate —H— consists of the opposite sections —H'—H²—, which are secured to a base —H³— by suitable fastening means —h—h—; 95 and of the cross plates —h'—h²—h³— arranged one above the other with their adjacent faces separated in order to form guides —h⁴—h⁵—h⁶— for the actuating plates or slides —I—I'—I²—. The cross plates —h'—h²—h³— are secured in position by suitable 100 securing means —h⁷— passed through the upright walls of the sections —H'—H²— into the ends of said plates, and the top plate —h³— is formed with a pair of openings —h⁸—h⁸—, which are closed by movable sections or plates 105 —h⁹—h⁹— of any suitable form, size, and construction.

The slides —I—I'—I²— preferably consist of plates rectilinearly movable in the guides —h⁴—h⁵—h⁶—, and are formed at their central 110 portions with slots —i³—i⁴—i⁵— for receiving cams —j—j'—j²— for reciprocating said plates or slides. The cams —j—j'—j²— are mounted upon a rocking shaft —J— journaled in the standard or gate —H— and provided 115 at its upper end with an actuating lever or crank which is movable around a circular rack or guide —H⁴— arranged at the upper end of the standard —H— and formed with notches or grooves —h¹⁰—h¹¹— 120 h¹²— and —h¹³—. The actuating lever or crank preferably consists of the inner section —J²— and the outer section —J³— hinged thereto at —J⁴—, and formed with an inwardly projecting arm —J⁵— adapted to enter 125 a slot —J⁶— at the outer end of the section —J²— and with an outwardly projecting arm —J⁷— adapted to enter the notches or grooves —h¹⁰—h¹¹—h¹²—h¹³—.

In the practical operation of a switch provided with two or more sets or pairs of switch 130 or rail points, it is necessary that the separate sets or pairs move consecutively, and that each pair remains stationary during the move-

ment of the other pairs. Consequently the slots $i^3-i^4-i^5$ of the actuating plates or slides $I-I'-I^2$ and the cams $j-j'-j^2$ upon the rocking shaft J are so relatively constructed and arranged that said plates or slides move consecutively the lower plate I moving first and the upper plate I^2 last, and that each is firmly held in its adjusted position during the movement of the other plates. The slot i^3 is formed with the substantially parallel sides or faces i^6-i^7 , extending in planes substantially parallel with the longitudinal sides of the plate or slide I , and with the sides or faces i^8-i^9 , portions of which extend at substantially right angles with the former sides. One end i^{10} of the side or face i^8 extends outwardly from the remaining portion of said face, and the opposite end of the side or face i^9 is formed with a notch or groove i^{11} extending outwardly from said face. The cam j is formed with a hub j^3 , which normally, as shown at Fig. 6, bears against the portion of the face or side i^3 of the slot i^3 adjacent to the portion i^{10} thereof, and prevents the slide I from outward movement in the direction indicated by arrow 1 at said figure.

j^4-j^5 represent separated bearing faces on the cam j consisting of anti friction rollers mounted on arms j^6-j^7 . The centers of these rollers are arranged equidistant from the center of the shaft J , and, as shown at Fig. 6, the roller j^4 bears normally against the face i^7 of the slot i^3 , and the roller j^5 bears normally against the face i^8 of said slot, and prevents the slide I from inward movement in the direction opposite to that indicated by the arrow 1 .

The actuating lever or crank of the cam rocking shaft J is normally engaged with the groove or notch h^{10} of the guide or rack H^4 . As this lever or crank is moved a quarter turn into engagement with the notch or groove h^{11} of said guide or rack H^4 the cam j is also moved a quarter turn, as clearly shown at Fig. 7, and the bearing face j^4 is caused to engage the portion i^{10} of the slot face i^8 of the slide I , and move into engagement with the remaining portion of said face and thus force said actuating plate or slide inwardly, as shown at Fig. 7. It will be readily understood that this movement of the plate or slide I separates the extremity b' of the switch or rail point B' from the inner face of the rail A , and engages the corresponding end b of the switch or rail point B with the inner face of the opposite rail A . The portion i^{10} of the face i^8 extends outwardly from the remaining portion of said face a sufficient distance to permit the cam j at the commencement of its operation to move a sufficient distance to prevent clamping of the side i^9 against the roller j^5 as the roller j^4 reciprocates

the plate or slide I . When the cam j is in its position shown at Fig. 7, it will be noted that the hub j^3 bears against the slot face i^9 , and that said hub and the roller j^4 prevent the slide I from inner or outward movement and firmly hold the same in position. As the shaft J is rocked a second quarter revolution so that its actuating lever or crank engages the notch h^{12} the cam j is correspondingly rocked, and its roller j^4 then assumes the position shown by dotted lines at Fig. 7, and its roller j^5 assumes the position occupied by full lines by the roller j^4 when the cam j has been moved but a single quarter revolution. The roller j^5 then prevents the slide I from outward movement. As the shaft J is rocked a third revolution the roller j^4 enters the curved groove or notch i^{11} opening from the adjacent end of the slot side or face i^9 , and, thereby prevents the slide I from movement in its guide h^4 . It will be readily understood that the last two movements of the cam j do not vary the position of the slide I , and that, as the cam is returned to its normal position, the first two movements corresponding to the last two, previously described, do not vary the position of the slide, but that, as the cam in returning, is moved the last quarter turn, the roller j^5 bears against the slot side or face i^9 , as shown at Fig. 7, and returns the slide I to its normal position, and that, during this movement of the slide, the roller j^4 registers with the outwardly extending portion i^{10} of the slot face or side i^8 .

The slot i^4 is formed with faces or sides $i^6-i^7-i^8$ and i^9 of similar construction and arrangement to the like faces of the slot i^3 , with the exception that the face i^9 is unprovided with a rearwardly extending notch or groove corresponding to the groove i^{11} of the corresponding face i^9 of the slot i^3 . The face i^8 of the slot i^4 is formed with an outward extension i^{10} corresponding to the similar extension of the like face of the slot i^3 . The cam j' is formed with a hub j^3 , rollers j^4-j^5 , and arms j^6-j^7 corresponding to the like parts of the cam j .

At Fig. 8 I have illustrated the cam j' as in its normal position, and it will be noted that the plate or slide I' actuated thereby is prevented from lengthwise movement by the engagement of the hub j^3 with the slot face i^8 and of the roller j^4 with the slot side i^9 . The first quarter turn of the shaft J correspondingly moves the cam j' , so that its roller j^4 assumes the position shown by dotted lines at Fig. 8, and its roller j^5 the position assumed by the roller j^4 when said cam is in its normal position. This movement of the cam j' does not, however, reciprocate the slide I' . It will also be readily noted, however, that at the end of the first quarter revo-

lution of the shaft —J—, the cam —j'— occupies the same position relative to the sides of the slot —i⁴— as, at before the commencement of the first quarter revolution of the shaft —J— the cam —j— occupies relative to the sides of the slot —i³—, which, as previously stated, are similar in construction and arrangement to the sides of the slot —i⁴—. Consequently as the shaft —J— is moved a second quarter turn the slide —I'— is drawn inwardly, and the cam —j'— assumes the position shown at Fig. 9 with its hub —j³— and its forward roller —j⁴— locking the slide from further movement. This movement of the slide —I'— through the medium of the connections, previously described, moves or rocks the end —c'— of the switch or rail point —C'— from engagement with the inner face of the rail —A— and moves or rocks the corresponding end —c— of the switch or rail point —C— into engagement with the inner face of the switch or rail point —B—. The third revolution of the shaft —J— moves the cam —j'— a quarter turn within the slot —i⁴—, so that its forward roller assumes the position shown by dotted lines at Fig. 9, but it will be understood that this movement of the cam does not vary the position of the slide —I'— in like manner as the second quarter revolution of the cam —j— does not vary the position of the slide —I—.

The slot —i⁵— is formed with sides or faces —i⁶—i⁷—i⁸— and —i⁹— corresponding to the like sides of the slot —i³—, with the exception that the outwardly projecting portion —i¹⁰— of the face or side —i⁸— and the outwardly extending notch or groove —i¹¹— of the side —i⁹— are arranged at the ends of said sides, opposite to the ends at which the corresponding outward projection —i¹⁰— and guide —i¹¹— of the slot —i³— are arranged. The cam —j²— is of similar construction to the cams —j—j'— and in its normal position is arranged, as shown in Fig. 10, with its hub —j³— bearing against the face —i⁹— and its rear roller —j⁵— within the notch or groove —i¹¹— for preventing the slide —I²— from movement.

The first quarter turn of the shaft —J— rocks the roller —j⁴— to the position shown by dotted lines at Fig. 10 into engagement with the face —i⁸— for preventing inner movement of the plate or slide —I²—, and the second quarter revolution of the shaft —J— rocks the roller —j⁴— into engagement with the face —i⁹— as shown by dotted lines at Fig. 10, and rocks the roller —j⁵— into the position occupied by the roller —j⁴— at the end of the former quarter revolution of said shaft. The last or third quarter revolution of the shaft —J— rocks the cam —j²— into the position shown by Fig. 11, and, during said movement, the roller —j⁴—, previously engaged with the face —i⁹—, forces the slide or plate —I²— inwardly in the direction shown by arrow —2— at Fig. 10. When the cam —j²— is in this position its hub —j³— and the

roller —j⁴— operate to prevent the plate or slide —I²— from lengthwise or reciprocal movement. Through the medium of the connections, previously described, this movement of the plate or slide —I²— rocks or moves the end —d'— of the switch or rail point —D'— from engagement with the inner face of the rail —A²—, and rocks or moves the corresponding end —d— of the rail or switch point —D— into engagement with the inner face of the rail —C²—.

It will be readily understood that, as the shaft —J— is rocked from its position assumed at the end of its third quarter revolution, its first return quarter revolution operates the cam —j²— to force the plate or slide —I²— to its normal position, shown at Fig. 10; its second return quarter revolution operates the cam —j'— to return the plate or slide —I'— to its normal position, and forces the cam —j²— to a position for preventing the plate or slide —I²— from lengthwise movement, and that its third return quarter revolution, as previously described, rocks the cam —j— to its normal position for returning the slide or plate —I— to its position shown at Fig. 6, and rocks the cams —j²—j'— to their normal positions shown at Figs. 8 and 10.

The cams —j—j'—j²—, previously described, are, as illustrated, formed separable one from the other, and are independently placed upon the rocking shaft —J—, but it will be evident that they may be formed integral with each other if desired.

—K— represents a stop or pin passed through openings —k—k'—k²— formed respectively in the cross plates —h'—h²—h³— of the standard —H— and in the left-hand ends of the actuating plates or slides —I—I'—I²— for also preventing the lengthwise movement of said plates within their respective guides and relieving the shaft —J— of the strain incidental to such action. As each plate assumes an inner and an outer position they are each provided with a pair of openings —k³—k³— one in advance of the other in order that they may be locked in either position. This is a peculiarly simple, practical, and effective construction of actuating plates or slides and operating cams for alternately shifting or varying the positions of the separate pairs of switch or rail points, since, as is evident to one skilled in the art, the plates and cams, and the standard or gate for supporting the same, are economically constructed, readily assembled, and are durable, practical, and strong in use.

At Fig. 13 I have shown a slightly modified form of my invention provided with rails —A—A—, —A'—, —B²—, —C²—, —B³—, —C³—, and rail points —b,—b'—, —c,—c'— corresponding to the like parts as shown at Fig. 1. The rail points —b,—b'—, —c,—c'— are connected together by the connecting or bridle bars —L—L'— to the outer ends of which are suitably secured the outer ends of spring levers —l—l—. The inner ends of

the levers —*l*—*l*— are connected by links —*l'*—*l'*— to lugs —*i*—*i'*— upon actuating plates or slides —*I*—*I'*— corresponding to the like plates or slides, as shown in the preceding figures with the exception that the plate —*I*— is shown as above the plate —*I'*—. These plates are reciprocated by cams, not illustrated, mounted upon a shaft —*J*— journaled in a standard —*H*— and corresponding to the similar shaft of the preferable form of my invention and provided with an actuating lever or crank —*J'*— corresponding to the previously described actuating lever. The central portions of the spring lever —*l*—*l*— are each pivotally supported by the opposite sections —*l*²—*l*³— of a spring shackle or pocket, journaled respectively in the opposite sections —*l*⁴—*l*⁵— of a suitable frame mounted upon suitable cross timbers or ties —*a*—. The outer and inner ends of the spring levers —*l*—*l*— are provided with boxes or frames —*l'*— within which they reciprocate, and these boxes are respectively connected in any suitable manner to the links —*l'*—*l'*— and to the connecting or bridle bars —*L*—*L'*—.

The only difference between this form of my invention as shown at Figs. 13, 14, 15, and that shown in the preceding figures, is the connecting mechanism between the actuating plates or slides of my improved switch, and the rail points. This modification is only shown, however, for the purpose of illustrating that my invention is not limited to the exact form of means used for conveying motion from the actuating plates or slides to the rail points, and as the exact construction and arrangement of such mechanism, as shown at Figs. 13, 14, and 15, forms no part of my present invention, it is unnecessary to further illustrate or describe the same.

In the practical operation of my invention when the outer section *J*³ of the actuating lever or crank is in its position, shown at Fig. 1, the rail points of my improved switch are so arranged that the car coming from the main track —*A*— is guided to the tracks *A'* *B*³, and the actuating plates or slides are projected to their utmost limit from the standard or gate —*H*—. As the actuating lever or crank is moved to the notch —*h*¹¹— the cam —*j*— forces the actuating plate or slide —*I*— inwardly as shown at Fig. 7, and by means of the rail points —*B*—*B'*— connects the rails —*B*²— *C*³— with the main track —*A*— and during the movement of the slide —*I*—, the slides —*I'*—*I*²— remain in their previous position. The actuating lever or crank is then moved into engagement with the notch —*h*¹²— and the cam —*j'*— draws the slide or plate —*I'*— inwardly and by means of the rail points —*C*—*C'*— connects the rails —*C*²— *D*³— with the main track, and during said movements of the slide —*I'*— the slide —*I*— is unmoved. The actuating lever or crank is finally moved into engagement with the slot —*h*¹³— and the cam —*j*²— forces the slide —*I*²— inwardly and by means

of the rail points —*D*—*D'*— connects the rails —*D*²—*A*²— to the main track, but during this movement of the slide —*I*²—, the slides —*I*—*I'*— remain unmoved.

It will be particularly noted that my invention is simple, practical and effective, economical in manufacture, and strong and durable in use. It is evident, however, that the detail construction and arrangement of the parts of my switch may be considerably varied without departing from the spirit of my invention. Hence I do not specifically limit myself to the described construction and arrangement thereof.

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

1. In a switch, the combination with movable switch points; of a standard or gate formed with a guide and a stop receiving opening, an actuating plate or slide reciprocally movable in said guide, and connected, substantially as described, to said points and formed with a stop receiving opening, and a stop or pin passed through said stop receiving openings, substantially as and for the purpose described.

2. In a switch, the combination with movable switch points; of a standard or gate formed with a guide, an actuating plate or slide reciprocally movable in said guide, and connected, substantially as described, to said switch points for operating the same and formed with a slot having opposite engaging faces, and a cam supported by said standard or gate and formed with a pair of separate engaging faces bearing against said walls of the slot for reciprocating said actuating plate or slide and for holding the same in position, substantially as and for the purpose set forth.

3. In a switch, the combination with movable switch points; of a standard or gate formed with a guide and a stop receiving opening, an actuating plate or slide, reciprocally movable in said guide, and connected, substantially as described, to said switch points for operating the same, and formed with a slot having opposite engaging faces, said plate or slide being provided with a stop receiving opening, a cam supported by said standard or gate and formed with a pair of separated engaging faces bearing against said faces of the slot for reciprocating said actuating plate or slide and for holding the same in position, and a stop or pin passed through said stop receiving openings, substantially as and for the purpose specified.

4. In a switch, the combination with movable switch points; of a standard or gate formed with a guide, an actuating plate or slide reciprocally movable in said guide and formed with a slot having opposite engaging faces and connected, substantially as described, to said switch points for operating the same, a rocking shaft journaled in said standard or gate for engaging one of the faces of said slot and holding the actuating plate or

slide in position, and a cam on said shaft for engaging another of the faces of the slot and reciprocating said plate or slide, substantially as specified.

5. In a switch, the combination with movable switch points; of a standard or gate formed with a guide, an actuating plate or slide reciprocally movable in said guide and formed with opposite bearing surfaces and connected, substantially as described, to said switch points for operating the same, a rocking shaft journaled in said standard or gate and provided with a face for engaging one of said surfaces and holding the actuating plate or slide in position, and a cam on said shaft interposed between the separated bearing faces of the actuating plate or slide and formed with separated engaging faces bearing against said opposite faces of the plate or slide for reciprocating said plate or slide and for holding the same in its operative position, substantially as and for the purpose set forth.

6. In a switch, the combination with movable switch points; of a standard or gate formed with a guide, an actuating plate or slide reciprocally movable in said guide and formed with opposite bearing surfaces and connected, substantially as described, to said switch points for operating the same, a rocking shaft journaled in said standard or gate and provided with a face for engaging one of said surfaces and holding the actuating plate or slide in position, and a cam on said shaft formed with a pair of rollers arranged equidistant from said shaft for reciprocating the plate or slide and for holding the same in its adjusted position, substantially as and for the purpose described.

7. In a switch, the combination with movable switch points; of a standard or gate formed with a guide, an actuating plate or slide reciprocally movable in said guide and connected, substantially as described, to said switch points for operating the same, a shaft journaled in said standard or gate, a cam on said shaft for engaging and reciprocating the plate or slide, and a movable section or plate for the standard or gate for permitting access to said plate or slide and to said cam, substantially as specified.

8. In a switch, the combination with movable switch points; of a standard or gate formed with a guide, an actuating plate or slide movable in said guide and connected, substantially as described, to said switch points for operating the same, and provided with opposite transverse bearing faces, one of which is formed with a portion extending outwardly from the remaining portion thereof, and a cam having separated bearing faces for engaging said faces of the plate or slide, substantially as set forth.

9. In a switch, the combination with mov-

able switch points; of a standard or gate formed with a guide, an actuating plate or slide movable in said guide and connected, substantially as described, to said switch points for operating the same and provided with opposite transverse bearing faces, one end of one of said faces extending outwardly from the remaining portion thereof and the opposite end of the other of said faces being provided with a rearwardly extending groove extending outwardly from said other face, substantially as described.

10. In a switch, the combination with two pairs of movable switch points; of a standard or gate, an actuating plate or slide movable in said standard or gate and connected to one pair of said switch points for operating the same, said plate or slide being provided with opposite transverse bearing faces, one of which is formed with a portion extending outwardly from the remaining portion thereof a second actuating plate or slide movable in said standard or gate above the former plate or slide and connected to the other pair of said switch points for operating the same, and provided with opposite bearing faces and a cam supported by the standard or gate and formed with upper and lower opposite bearing faces interposed between the bearing faces of said upper and lower plates or slide for operating the same successively, substantially as and for the purpose specified.

11. In a switch, the combination with two pairs of movable switch points; of a standard or gate, an actuating plate or slide movable in said standard or gate and connected to one pair of said switch points for operating the same, said plate or slide being provided with opposite transverse bearing faces, one of which is formed with a portion extending outwardly from the remaining portion thereof, a second actuating plate or slide movable in said standard or gate above the former plate or slide and connected to the other pair of said switch points for operating the same, and provided with opposite bearing faces a cam supported by the standard or gate and formed with upper and lower opposite bearing faces interposed between the bearing faces of said upper and lower plates or slides for operating the same successively, and a stop for engaging said plates or slides and preventing the same from movement, substantially as set forth.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 14th day of October, 1892.

GEORGE HARGREAVES.

Witnesses:

CLARK H. NORTON,
M. BAXTER.