No. 760,200. PATENTED MAY 17, 1904.

I. F. HARRIS.

SWITCH.

APPLICATION FILED FEB. 15, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

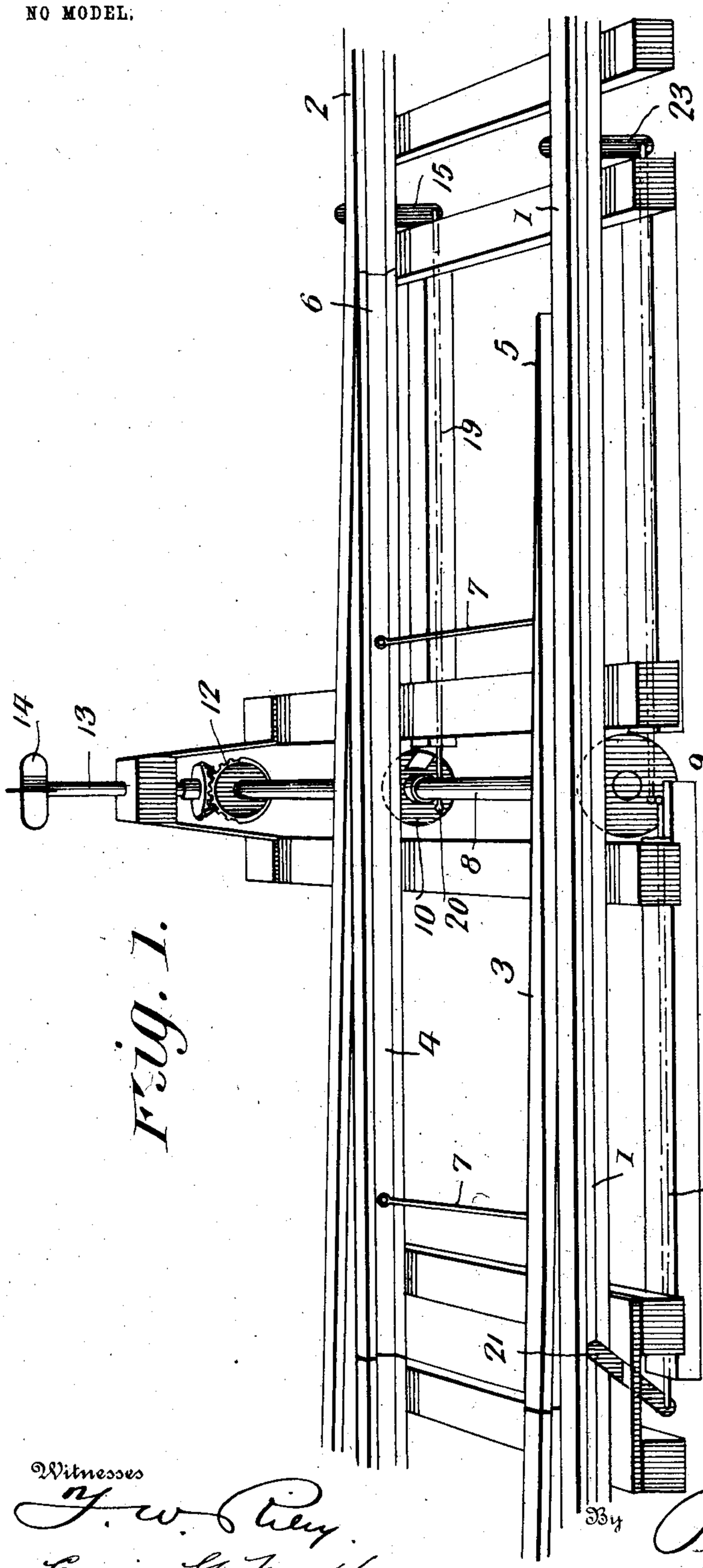

Fig. 1.

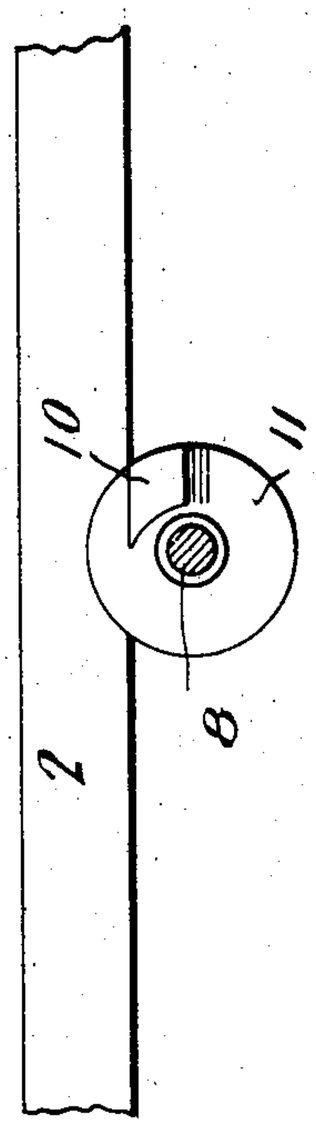

Fig. 2.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

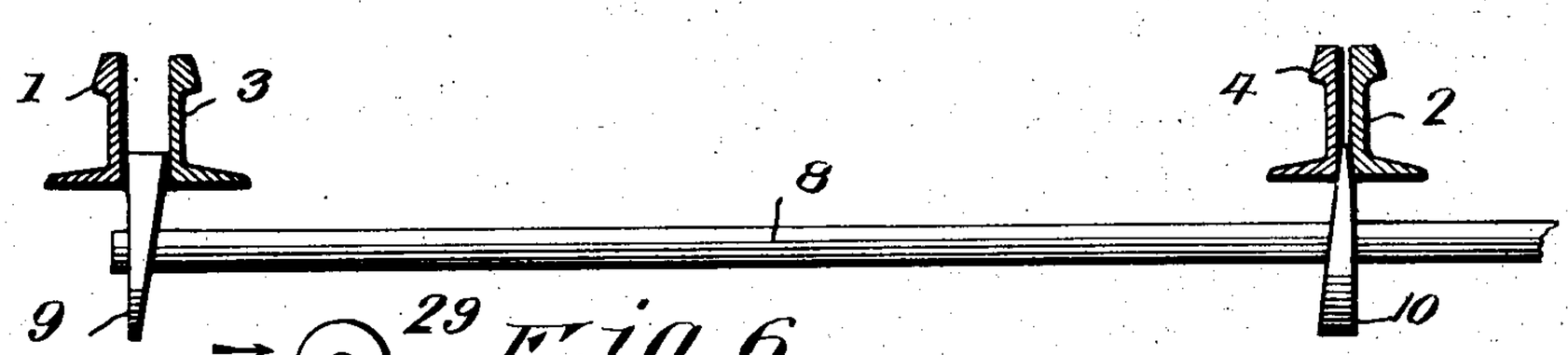


Fig. 6.

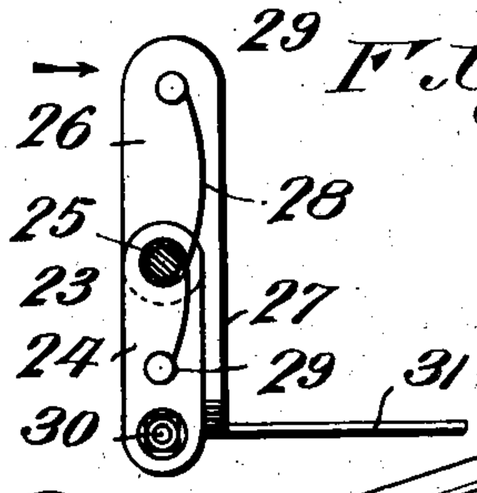


Fig. 4.

Fig. 5.

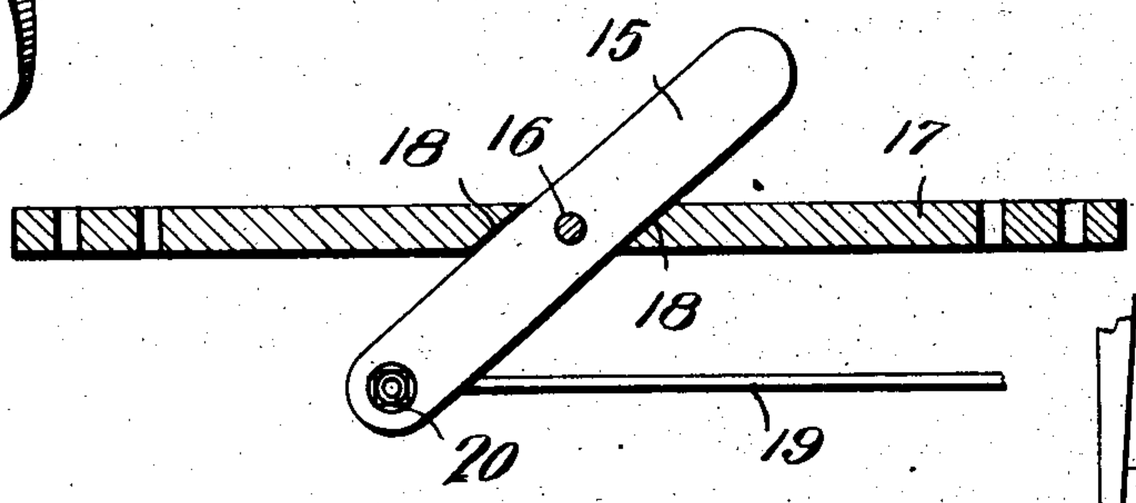
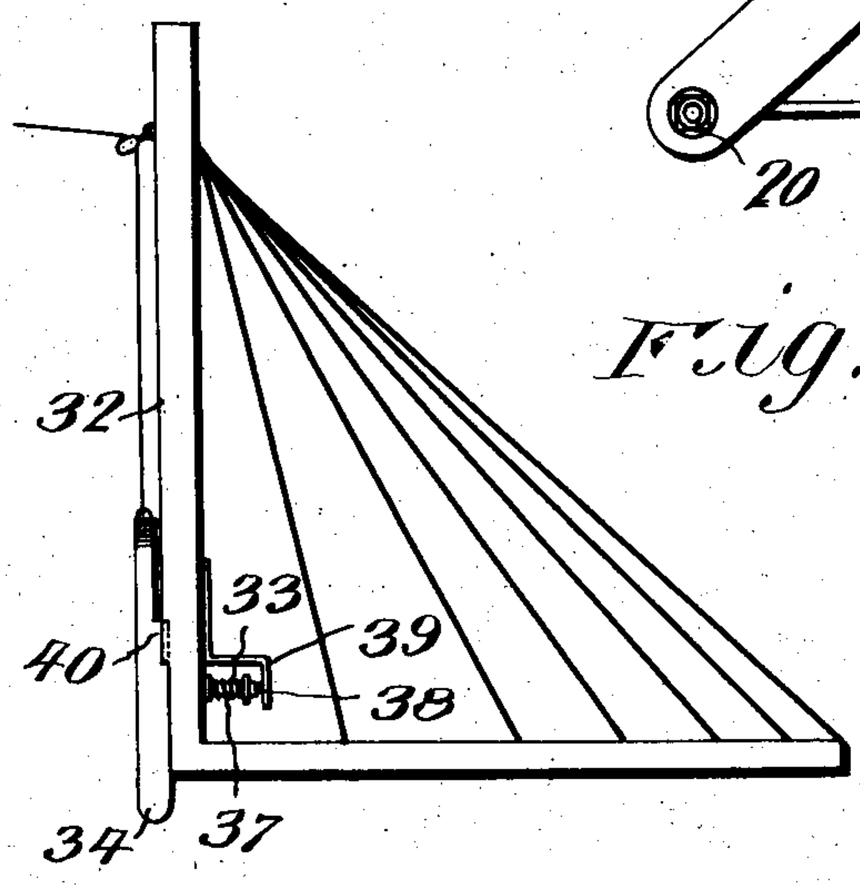


Fig. 7.



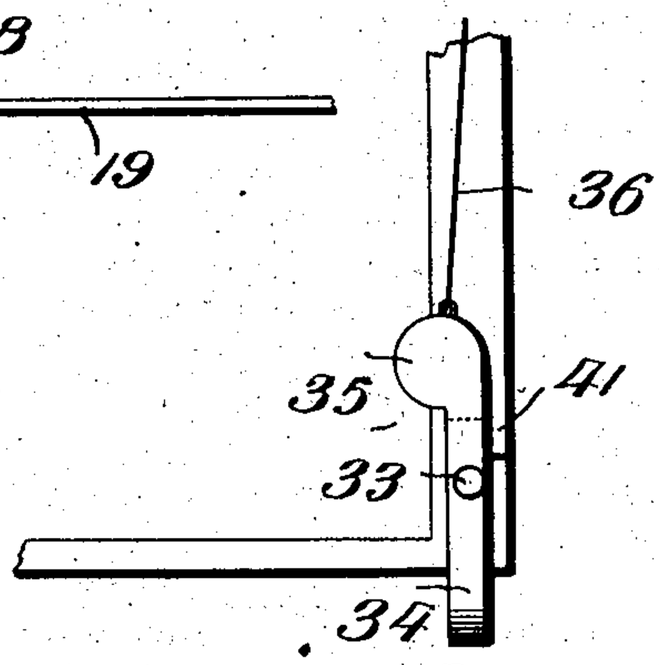


Fig. 8.

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No. 760,200. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

IRVIN F. HARRIS, OF FROST, TEXAS.

SWITCH.

SPECIFICATION forming part of Letters Patent No. 760,200, dated May 17, 1904.

Application filed February 15, 1904. Serial No. 193,614. (No model.)

To all whom it may concern:

Be it known that I, IRVIN F. HARRIS, a citizen of the United States, residing at Frost, in the county of Navarro and State of Texas, have invented a certain new and useful Switch, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to automatic switches, the object in view being to provide means whereby a switch is automatically operated by a moving train either for the purpose of opening or closing the switch, the said means being under the control of the engineer, who without stopping the train may open the switch and run his train onto the switch-rails or a siding without slowing up the train further than is necessary to avoid derailing the train when passing from the main line to the switch or siding.

A further object of the invention is to so construct and arrange the parts of the switch and the operating mechanism that simplicity and reliability are obtained without resort to delicate parts which would render the mechanism liable to get out of order.

With the above and other objects in view, the nature of which will more fully appear as the description proceeds, the invention consists in the novel construction, combination, and arrangement of parts, as hereinafter fully described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a perspective view of a switch embodying the present invention. Fig. 2 is a detail section showing one of the cams or spreaders in its relation to one of the switch-rails. Fig. 3 is a cross-section taken in line with the rocking switch-shaft, showing the relation existing between the cams or spreaders and the main and switch rails. Fig. 4 is a perspective view of the rocking switch-shaft and the cams thereon. Fig. 5 is an enlarged detail section showing one of the trip-levers and the plate in which it is mounted. Fig. 6 is a detail side elevation of a sectional and folding trip-lever. Fig. 7 is a side elevation of the pilot-frame of a locomotive, showing the switch-thrower mounted thereon. Fig. 8 is a detail rear elevation of the same.

Like reference-numerals designate corresponding parts in all the figures of the drawings.

Referring to the drawings, 1 and 2 designate the main rails adjacent to a switch, and 3 and 4 designate the switch-rails, the rail 4 forming a portion of the main line and the rail 3 forming a portion of the siding. The rail 3 terminates in a point 5, which is adapted to lie close to the main rail 1, while the rail 4 terminates in a point 6, which is adapted to lie close to the rail 2, as shown in Fig. 1. The rails 3 and 4 are further connected by means of stay rods or braces 7, arranged at suitable intervals, so as to cause both of said rails to move simultaneously together in the same direction when acted upon by the operating mechanism hereinafter described.

The mechanism for operating the switch comprises, essentially, a rotatably-mounted rock-shaft 8, which extends transversely across the road-bed at a short distance from the extremities 5 and 6 of the switch-rails, said shaft being journaled in suitable bearings on the road-bed. At a point immediately in line with the space between the rails 1 and 3 a cam 9 is mounted fast on the shaft 8, and a similar cam 10 is mounted fast on the shaft in line with the space between the rails 2 and 4. Each cam is in the form of a circular wedge, as best shown in Figs. 3 and 4, in which it will be observed that the outer face of each cam is at right angles to the shaft 8, while the inner face thereof is made slanting or at an angle oblique to the opposite face. In this way each cam is provided with a thick and a thin edge, or, in other words, the cam gradually tapers from a thick edge at one side to a thin edge at a diametrically opposite point. It will also be observed that the thin edge of one cam is located on the opposite side of the shaft from the thin edge of the other cam. Therefore when the thick edge of one cam is up the thick edge of the other cam is turned down, as clearly shown in Fig. 3. The upper edge portions of the cams rest and operate at all times between the rails above them. The shaft 8 is capable of rocking or oscillating to a limited extent only, and in order to limit such rocking movements in opposite di-

rections one of the cams is provided with a stop shoulder or lug 11, which by coming in contact with the base of one of the rails arrests the movement of the shaft in one direction, while a similar shoulder or lug on the other cam coöperates with the base of the adjacent rail and limits the rocking of the shaft in the opposite direction. In this way a certain throw is given to the cams and transmitted to the switch-rails for shifting the latter to one side or the other, and thereby closing or opening the switch, according to the direction of rotation of the rock-shaft.

The rock-shaft 8 is continued beyond the cam 10, where it is operatively connected by suitable beveled gearing 12 with the vertical stem or shaft 13 of a semaphore 14, which serves to indicate to the engineer whether the switch is closed or open. If desired, any suitable handle or lever may be associated with the semaphore-shaft, so that the switch may be operated by hand in addition to the automatic operating mechanism now to be described.

Arranged at a suitable distance beyond the end of the switch-rails is a trip-lever 15, which is fulcrumed at 16 intermediate its ends on a plate 17, secured firmly to the roadbed and preferably to the ties. The trip-lever 15 normally stands erect, but is adapted to be thrown down to an inclined position, as shown in Fig. 5, by beveling the opposite walls of the slot through which the lever passes, as shown at 18, the upper and lower walls of the slot being reversely beveled, and thereby forming limiting-shoulders for arresting the swinging movement of the lever and also preventing accumulation of dirt in the slot in the plate. The upper arm of the lever 15 projects sufficiently to be acted upon by the switch-throwing device on the train, while the lower arm of the lever has pivotally connected thereto one end of a connecting-rod 19, the opposite end of which is pivotally connected to the cam 10 at the point 20, as shown in Fig. 1. Another trip-lever 21 is arranged at a suitable point in the track on the opposite side of the terminals of the rails 3 and 4 from that on which the lever 15 is located, the lever 21 corresponding in all parts with the lever 15 and having a connecting-rod 22 attached thereto at one end and pivotally attached at the other end to the cam 9 at the point 23, as shown in Fig. 1. Still another trip-lever 23 is mounted adjacent to the rail 1 opposite the first-described lever 15, as shown in Fig. 1, but is arranged at the inner side of the rail in contradistinction to the levers 15 and 21 at the outside of the rails. The levers 15 and 21 are adapted to be operated by a switch-throwing device carried by the train, whereas the lever 23 is operated by the flange of the rearmost wheel of the train in backing toward the point of the switch, as will hereinafter appear.

In order that the trip-lever 23 may yield to allow the wheels to pass by it without operating the switch when moving in one direction, said lever is made sectional and folding, or, in other words, comprises the main section 24, which is pivoted at 25, and a hinged section 26, which is fulcrumed on the pivot 25 and provided with a limiting shoulder or arm 27, which bears against one side or edge of the section 24, thereby causing both sections to rock or vibrate together when pressed in the direction indicated by the arrow in Fig. 6. When, however, pressure is exerted on section 26 in the opposite direction, it tilts on the pivot 25 and allows the flange of each wheel to pass by it, the section 26 being restored to its normal position (shown in Fig. 6) by means of a spring 28, passing around the pivot 25 and having its opposite ends secured to the lever-sections, as shown at 29. The lower end of the lever has pivotally connected thereto at 30 a connecting-rod 31, which extends to and pivotally connects with the cam 9, as shown in Fig. 1.

In order to operate the switch, a switch-thrower in the form of a pivoted lever or arm is mounted on one of the uprights 32 of the pilot-frame of the locomotive, as shown in Figs. 7 and 8. Said lever is fulcrumed on a journal 33, which is parallel to the length of the rail adjacent to which it operates, so that the switch-thrower swings laterally with respect to the direction of movement of the train. The thrower-lever is fulcrumed intermediate its ends, as shown in Fig. 7, and the lower arm 34 of said lever projects downward on the outside of the rail, so as to come in contact with one or the other of the levers 15 and 21, so as to vibrate the lever and operate the switch. The upper arm of the lever is weighted on one side, as shown at 35, to cause it to normally swing to a substantially horizontal position when released by the operating-cord 36, which leads through suitable guides to a point within reach of the engineer, who, by pulling on the cord, may rock the switch-thrower to the position shown in Fig. 7, when it becomes operative. In order to avoid strain and jar on the switch-thrower, the pivot 33 preferably consists of a pin or bolt which passes through the pilot-frame and is encircled by a spring 37, interposed between the frame and a collar or nut 38 on the end of the bolt. Thus when the arm 34 strikes one of the trip-levers it may yield backward to relieve the concussion of the blow. The extremity of the bolt 33 rests against a stop in the form of a bracket 39, connected to the pilot-frame, which serves to prevent the spring 37 from holding the switch-thrower too tightly against the pilot-frame to allow of the free pivotal movement of said thrower. The thrower is further provided with a shoulder 40, which is adapted to come in contact with a corresponding shoulder 41 on the pilot-frame for properly positioning the thrower

when in position to coöperate with the trip-levers on the road-bed.

By means of the construction hereinabove described the engineer by setting the switch-thrower may open or close the switch while the train is moving, the operation being safely performed while the train is running at considerable speed—for example, a speed which will be safe for the train while passing from the main track onto a switch. Suppose a train to be approaching the point of the switch. The switch-thrower then comes in contact with the trip-lever 15 and opens the switch, so as to pass onto the siding, the lever 15, through the connecting-rod 19, serving to rock the shaft 8 and move the thick portion of the cam 10 between the rails 2 and 4 and the thin portion of cam 9 between the rails 1 and 3, thereby opening the switch. When the train is moving along the main track in the opposite direction, the switch-thrower operates on the trip-lever 21, rocking the shaft 8 in the opposite direction and throwing the switch-rails to the other side. Now should the train desire to back onto the switch or siding the flange of the advance wheel comes in contact with and depresses the lever 27, which through the medium of the rod 31 opens the switch. When the train is moving in an opposite direction, the folding member or section 26 of the trip-lever 23 yields downward out of the way without having any effect on the switch-operating mechanism. The spring trip-lever is especially designed for use at the two outstanding points of a railway Y, but may also be used in place of the trip-levers 15 and 21.

Changes in the form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention.

Having thus deseribed the invention, what is claimed as new is—

1. In a railway-switch, the combination with the main rails and the switch-rails, of a rock-shaft, cams on said shaft operating between the switch-rails and main rails, and means operable by a moving train for turning said shaft.

2. In a railway-switch, the combination with the main rails and switch-rails, of cams having wedge-shaped portions working between the main rails and switch-rails, and means operable by a moving train for actuating said cams.

3. In a railway-switch, the combination with the main rails and switch-rails, of rotatably-mounted cams having wedge-shaped portions which work between the main rails and switch-rails, and means operable by a moving train for turning said cams.

4. In a railway-switch, the combination with the main rails and switch-rails, of rotatably-mounted cams the outer edges of which gradually increase in thickness from one point to another and work between the adjacent faces of the main rails and switch-rails, and means operable by a moving train for turning said cams.

5. In a railway-switch, the combination with the main rails and the switch-rails, of rotatably-mounted cams having wedge-shaped edges which work between the main rails and switch-rails, means for causing said cams to move in unison, and trip-levers located at a distance from the cams and operatively connected therewith.

6. In a railway-switch, the combination with the main rails and switch-rails, of a rock-shaft extending transversely across the track, disk-shaped cams mounted fast thereon and having edges which gradually increase in thickness from one side to the other and work between the main and switch rails, the thin edge of one cam being arranged on the opposite side of the shaft from the thin edge of the other, and trip-levers arranged at a distance from the shaft and operatively connected therewith.

7. In a railway-switch, the combination with the main rails and the switch-rails, of a shaft extending transversely across the track, disk-shaped cams mounted on said shaft and provided with thick and thin edges working between the rails, the thick and thin edges of the cams being reversely disposed, shoulders on the cams for limiting their turning movement in opposite directions, and trip-levers arranged at a distance from the shaft and operatively connected therewith.

8. In a railway-switch, the combination with the main rails and the switch-rails, of rotatably-mounted cams having thick and thin portions which work between the switch-rails, and main rails, a rock-shaft connecting said cams to cause them to turn in unison, and a sectional and folding trip-lever arranged at a distance from said shaft and operatively connected therewith said lever comprising a section which yields in one direction without operating the lever and which causes the lever to move when pressed in the opposite direction.

9. In a railway-switch, the combination with a shiftable switch and a trip-lever for operating the switch, of a switch-throwing device carried by a moving train and consisting of a spring-sustained lever adapted to yield upon coming in contact with the trip-lever, and means for moving the thrower-lever into and out of its operative position.

10. In a railway-switch, the combination with shiftable switch-rails, and a trip-lever operatively connected therewith for moving the switch, of a switch-throwing device comprising a lever, one arm of which is movable into and out of the path of the trip-lever, means for moving the throwing-lever into and out of its operative position, stops for limiting the movement of and positioning the throw-

ing-lever, a spring connected with the throwing-lever for allowing the same to yield upon coming in contact with the trip-lever, and means for relieving the tension of said spring so as to allow the throwing-lever to be moved freely to its operative or inoperative position, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

IRVIN F. HARRIS.

Witnesses:
L. M. ALLEN,
FRED. WAKEFIELD.