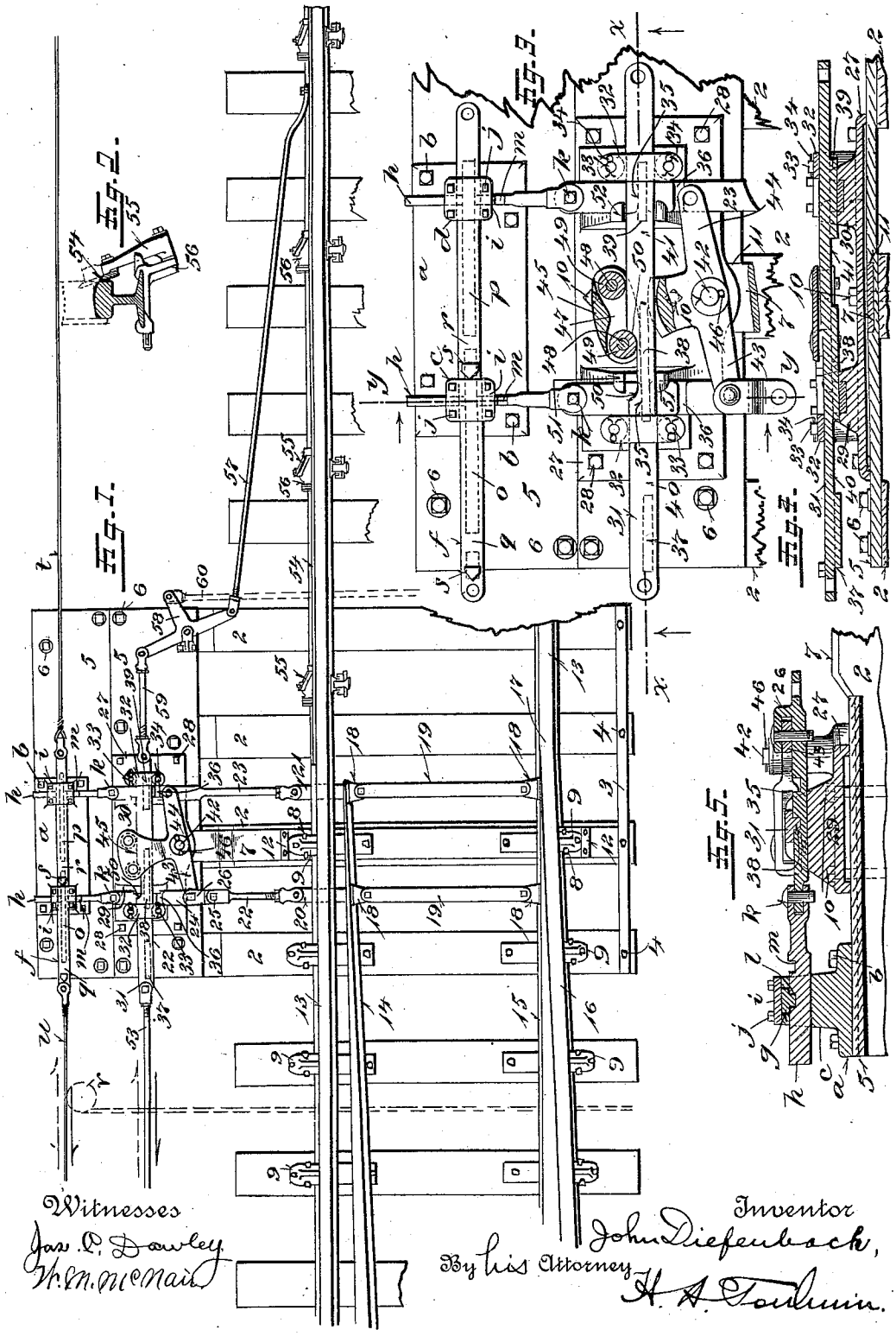
(No Model.)

J. DIEFENBACH.

INTERLOCKING SWITCH MECHANISM.

No. 544,089. Patented Aug. 6, 1895.



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INTERLOCKING SWITCH MECHANISM.

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To all whom it may concern:

Be it known that I, JOHN DIEFENBACH, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Interlocking Switch Mechanism, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in interlocking switch mechanism for railways.

My improvements have reference to means for adapting the apparatus for switch-rails pointing in either direction without changing the location of the apparatus; have reference to a construction by which the switch-bar or pitman is locked when the locking-bar or pitman is locked, so that both become locked and unlocked at the same time, and so that if either breaks the other will hold the switch; have reference to an organization by which when the signal is set for a clear track the switch-bar or pitman and the locking-bar or pitman are both locked by the signal-bar and the position of the switch cannot be changed except the signal be first set to indicate "danger," and have reference to other features and to certain details of construction. The organization, construction, and operation by which I carry out these objects in practice will more fully and at large appear in the description following, and will be particularly pointed out in the claims.

In the accompanying drawings, on which like reference letters and numerals indicate corresponding parts, Figure 1 is a plan view of a portion of the main-line and switch rails of a railway with improvements applied thereto. Fig. 2 is a transverse sectional view of one of the rails, the detector-bar, its supporting-link, and bracket. Fig. 3 is an enlarged plan view of my improved apparatus. Fig. 4 is a longitudinal vertical sectional view on the line $x\ x$ of Fig. 3, and Fig. 5 is a transverse vertical sectional view on the line $y\ y$ of Fig. 3.

My apparatus consists, essentially, of two parts, first, the signal-lock, and, second, the switch-lock. The cross-ties 2 upon which this apparatus is placed are lengthened and tied together at one end by an iron bar 3, bolted or spiked at 4, and at the other by a platform of boards 5, bolted or spiked at 6. A metallic plate 7 is placed upon one of the cross-ties and secured by the spikes 8, which hold the rail-chairs 9, and secured to the platform by bolts 10, and by being fitted to a channel 11 therein. The ties 2 are cut away at the top where the platform is located to place the apparatus at the proper height. The plate 7 has stops 12 abutting against the chairs 9 to assist in holding them. The object in lengthening these ties and providing with plate 7 is to positively fix the apparatus with respect to the rails so that there can be no independent lateral movement which would prevent the switch-rails from maintaining the proper contact with the rails when once adjusted.

The rails of the main line are shown at 13, and the switch-rails are shown at 14 and 15. A section 16 of one main rail deflects from the point 17 so as to form, in connection with the switch-rail 14, the junction or side track. The switch-rails 14 and 15 are laterally movable, as usual, and are interconnected by lugs 18 and bars 19. Extensions 20 and 21 from the lugs 18 pivotally connect with the switch-bar or pitman 22 and the locking-bar or pitman 23, the former having a section 24 pivoted thereto at 25, and having a bracket 26, where pivotal connection is made with a T-lever, presently to be described.

A stout metal plate 27 forms the base of the switch-lock, and is secured by bolts 28 to the platform 5. This base-plate has blocks 29 and 30, each transversely slotted to receive the pitmen 22 and 23, and each longitudinally slotted to receive the lock-bar proper 31. These blocks have caps 32 fitted over studs 33 extending from the blocks and held by cotter-pins or other means 34. These plates keep the locking-bar 31 in place. This bar in turn keeps the pitmen from raising out of the slots. Each pitman 22 23 has transverse notches 35 and 36 a distance apart equal to the movement to be given the switch-rails 14 15. The locking-bar 31 has three keys 37, 38, and 39, which fit at one time in the slots 35 and at another in the slots 36. Open spaces 40 and 41 are left respectively between the keys 37 and 38 and 38 and 39 to permit the pitmen to be reciprocated in the act of adjusting the switch-rails from one position to the other.

On a stout trunnion 42 rising from the base-

plate 27 I pivot a T-lever having arms 43, 44, and 45. A cotter-pin or other device 46 prevents the T-lever from slipping off of the trunnion 42. The arm 45 is slotted at 47 to receive the locking-bar 31 and has pintles 48 on which are mounted rollers 49. The locking-bar 31 is cut away where it passes through the slot 47 of the arm 45 to form shoulders 50, adapted to come in contact with the rollers 49, so as to swing the arm 45 and thus operate or vibrate the T-lever when the locking-bar is reciprocated. The blocks 29 30 preferably have lugs 51 and 52 overlapping the pitmen 22 and 23 to assist in holding them down in the slots of the blocks in which they travel. The locking-bar 31 is operated by a rod 53, sometimes made in the form of a pipe. This rod runs to the signal-tower where it is operated by means of a lever in the usual way. I have so far described my switch-lock. I will next refer to the usual detector-bar and its connection with my said lock. This detector-bar is shown at 54, where it is supported near the rail on hangers 55, pivoted to brackets 56, secured to the rail. A connecting-bar 57 connects the detector-bar with a T-lever 58 pivoted to the platform 5 and connected by a connecting-bar 59 with the locking-bar 31. Thus the detector-bar is adapted to perform its usual function of preventing any shifting of position of the switch-rails as the train approaches and goes over the switch-joint. A rod 60 connects with the T-lever 58 and runs to the tower-lever, should the tower-house be so located with respect to the switch-lock as to require this arrangement instead of rod 53.

I shall now describe my signal-lock and its connection with my switch-lock. It consists of a base-plate *a*, fastened by bolts *b* to the platform 5, and has brackets *c* and *d*, having slots *g*, for the locking-bolts *h*. These blocks *c* have caps *i*, held by screws or other fastenings *j*. The locking-bolts *h* are pivoted to the pitmen 22 and 23, respectively, as shown at *k*. These locking-bolts are also notched, as shown at *l* and *m*. The signal-bar *f* has keys *o* and *p* on the lower side, with a space *q* beyond the key *o* and a space *r* between the keys *o* and *p*. It also has a stop *s* on the upper side to limit its movement by coming in contact with the cap-plate *i*. The keys *o* and *p* are adapted to fit in the slots *l* and *m*, while the spaces *q* and *r*, when opposite the locking-bolts, permit the latter to be reciprocated, while when the locking-bolts *h* occupy the spaces *q* and *r* they lock the signal-bar against longitudinal movement.

The signal-bar is attached to a signal-wire *t* and an operating-wire *u*, which runs to the tower-house lever, either direct or around a pulley, and as shown by dotted lines at *v*, which is the case when the rod 60 is used.

Having now described the construction of my apparatus, I will describe its operation: In Fig. 1 the switch is set to maintain the main line, and is locked in that position by the presence of the keys 38 and 39 in the slots 35 of the pitmen 22 and 23. The locking-bolts *h* are also now engaged by the keys *o p*, occupying their notches 1. Thus the switch-lock is locked, first, by the keys 38 and 39 engaging with the pitmen 22 and 23, and, second, by the keys *o p* engaging with the locking-bolts *h*. Should, therefore, the locking-bar 31 be moved lengthwise until the spaces 40 and 41 come opposite the pitmen 22 and 23, with the intention of changing the switch to run the train off on a siding or junction, which might be done by a mistake or other carelessness or forgetfulness, the switch could not be so changed, because the locking-bolts would still be locked by the signal-bar *f*. Hence, while the signal still indicates that the right of way for the main line is open, the switch cannot be changed to carry the train to a siding or junction. The signal must first be operated to the position to indicate that the switch is adjusted to turn the train to one side on the siding or junction before it is possible to so adjust the switch-rails. On the other hand, it is clear that a tower-operator has it in his power to operate the signal-bar and signal without regard to a previous change of the switch-rails. This signal-bar is free to reciprocate in the blocks *c*, with its keys passing through the notches *l*, while the switch-locking mechanism remains locked. Now, let it be supposed that it is desired to run a train off on the side track or junction. The tower-operator first changes his signal to a position to indicate that. In doing this he permits the signal-bar *f* to move in the direction of the dotted arrow by the gravitating action of the semaphore-arm drawing on the signal-wire *t*. This will move the signal-bar *f* until the spaces *q r* are opposite the locking-bolts *h*. Then these bolts are free to be moved by the pitmen 22 and 23. Now the operator turns his attention to the lever that operates the rod 53, and pushing the locking-bar 31 in the direction of the dotted arrow, he brings the spaces 40 and 41 opposite to these pitmen, and during this movement presses one of the shoulders 50 against the roller 49, and thereby shifts the T-lever and draws upon the pitman 22, and hence changes the switch-rails to the new position. In doing this the pitmen 22 and 23 with the locking-bolts *h* slide outward in their respective blocks. This movement brings the notches 36 of the pitmen and the notches *m* of the locking-bolts in line with the keys on the locking-bar and signal-bar, respectively. Then a slightly-further movement of the locking-bar 31 will bring the keys 37 and 38, respectively, into the notches 36 and lock the pitmen. The gravitating movement of the signal just referred to having been somewhat further than necessary for the position to be assumed, the operator now draws the signal-bar back a little, bringing the signal to the true resting-point and placing the keys *o* and *p* across the notches *m* in the locking-bolts *h*. Thus, as in the first case, the switch is doubly locked, being locked by

the locking-bar and by the switch-bar in connection with their respective adjuncts. Therefore any future adjustment or shifting of the switch-rails must be preceded by first adjusting the signal and the signal-bar *f*. Hence in either position of the switch-rails they are doubly locked. In adjusting the switch-rails to the position last described, it will, of course, be understood that the detector-bar 54 was shifted on its hangers 55, as usual with such bars. It will also be observed that the T-lever on the stud 42 has an arm 44. This arm is normally disengaged, but is provided for the purpose of attaching the pitman 22 at that side of the lever by transferring it to the place of the pitman 23, and putting the latter in the place of the pitman 22. This shifting is done to accommodate the device to switch rails whose ends terminate in the opposite direction from those shown. Thus the pitman 23 is never attached to the T-lever, and its function, together with the locking-bolt *h* attached to it, is that of providing an additional locking means in case pitman 22 and the locking-bolt *h* attached to it should become broken; also, under these conditions, the operator would be unable to move the switch, as the T-lever would simply play idly back and forth in the locking-bar 31 without moving the pitman 23, even though the signal-bar *f* had been adjusted to permit the locking-bolt *h* attached to the pitman 23 to move. This safeguard is valuable in practice, as also this transferring of the pitmen according to the direction in which the switch rails point.

It is important that an apparatus of this kind be so constructed that it cannot be readily taken apart or portions removed and the switch unlocked. This is particularly so in times of strikes. It will be observed that with my switch-lock it cannot be taken to pieces while the bars 31 and *f* are locked by the tower-lever. To attempt this, in the first place the fastening devices over the plates 32 would have to be removed, then the fastening device on the stud 42; but even then the T-lever could not be raised out of place, because the arm 43 fits snugly under the bracket 26 and is held by a bolt. Then if it is attempted to vibrate the arm this bolt will prevent it through the pitman 22 and the keys on the bar 31 and bar *f* and bolt *h*. Then if the pivot-bolt be removed from the bracket 26 the T-lever still cannot be vibrated far enough to get the arm 43 from under the bracket 26, because the roller 48 will bind on the locking-bar 31, and until the arm 43 is withdrawn from under the bracket 26 the T-lever cannot be raised high enough to raise the locking-bar up high enough to clear the keys above the pitmen. Thus the device is practically inseparable to the extent of unlocking the switch while the locking-bars 31 and the signal-bar *f* are held by the tower-lever and intermediate connections.

In some cases the switch-rails 14 and 15 lead off to what is called a "derailing branch" or "switch," over which a train can be run off onto the ground. In using my apparatus in connection with such switch-rails the notches *m* in the locking-bolts *h* are omitted, for the purpose of preventing any change of position of the signal after the rails are so adjusted. For instance, the signal-bar *f* is permitted to move in the direction of the arrow and unlock the locking-bolts *h*. The spaces *q r* now stand across the said bolts. Then the switch-lock is operated, as above described, and these bolts *h* move until their notch *l* passes beyond the bar *f* and the solid part of the bolt *h* stands in the spaces *q* and *r*. Thus the signal-bar, with its signal, is locked in the position the signal should be in when the switch is turned to derail.

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

1. In an interlocking switch apparatus, the combination with notched pitmen and connected notched locking bolts, of a keyed locking bar and a keyed signal bar adapted, respectively, to intersect the pitmen and locking bolts to lock said pitmen and said bolts, and also adapted to reciprocate to unlock the same, and a lever connected to one of the pitmen and operated by the locking bar.

2. In an interlocking switch apparatus, the combination with a notched pitman and a connected notched locking bolt, of a keyed locking bar and a keyed signal bar, adapted respectively to intersect said pitman and bolt to lock the same and also adapted to reciprocate and unlock them, and a lever connected to said pitman and operated by the locking bar.

3. In an interlocking switch apparatus, the combination with a double notched pitman and a double notched connecting bolt, of a keyed locking bar, and a keyed signal bar, adapted respectively to intersect with and lock said pitman and bolt and to reciprocate to unlock the same, and a lever connected to the pitman and operated by the locking bar, a movement of the latter being adapted to move said pitman and bolt a distance equal to that between the two notches in each.

4. In an interlocking switch apparatus, the combination with a base plate having a block slotted in two directions a notched pitman fitted to one slot and a keyed locking bar fitted to the other, a lever pivoted on the said plate connected to said pitman, and operated by said bar, of another plate, a block thereon slotted in two directions, a notched locking bolt fitted to one of the slots and connected to said pitman, and a keyed signal bar fitted to the other slot, the said bars intersecting and locking the pitman and bolt and adapted to reciprocate to unlock the pitman and bolt respectively.

5. In an interlocking switch apparatus, the combination with a plate having blocks each slotted in two directions, a notched pitman in each block in one of the slots, a keyed locking

bar in the blocks and fitted to the other slots, a lever pivoted to the plate and to one of the pitmen, and operated by the locking bar, of another plate with blocks each having two slots, notched locking bolts connected to said pitmen, and one in a slot of each block, and a keyed signal bar in the other slots of the block, said bars acting to lock said bolts and pitmen respectively and arranged so that by adjusting the signal bar the bolts are unlocked, and then by adjusting the locking bar the pitmen are unlocked, and the lever is vibrated to move one of the pitmen.

6. In an interlocking switch apparatus, the combination with two switch rails, two double notched pitmen connected thereto and a double notched locking bolt connected to each pitman, of a keyed locking bar adapted to reciprocate to lock and unlock the pitmen, a lever pivoted to the plate and connected to one pitman and operated by said locking bar, and a keyed signal bar adapted to reciprocate to lock and unlock the locking bolts, the arrangement being such that the unlocking of said bolts must precede the movement of the pitmen and bolts by said lever and locking bar.

7. In an interlocking switch apparatus, the combination with a plate having blocks slotted in different directions, a double notched pitman fitted to each block in one of its slots, a keyed locking bar fitted to the other slot of each block, and arranged so that when its keys are in the notches the pitmen are locked and when the pitmen are in spaces between its keys said bar is unlocked, and the lever carried by the plate connected to one pitman and operated by the said bar.

8. In an interlocking switch apparatus, the combination with a plate having a block with slots in two directions, a notched pitman fitted in one of said slots, and a keyed locking bar in the other, a lever pivoted to the plate and to the pitman, rollers carried by the lever and forming shoulders, and shoulders on said bar to operate against said rollers to vibrate the lever, the arrangement being such that when the keys are in the notches the pitman is locked, and when the pitman is in the space between the keys said bar is unlocked.

9. In an interlocking switch apparatus, the combination with a plate having blocks, each with two slots, a notched pitman in one slot of each block, the pitman being transferable from one block to the other, a T-lever carried by the plate and adapted to connect with one pitman when in either block, and a keyed locking bar fitted to the other slots in the blocks and arranged to operate said lever.

10. In an interlocking switch apparatus, the combination with a plate having blocks with slots in different directions, and caps, a notched pitman fitted to a slot in each block, one pitman having a bracket, a T-lever pivoted to the plate and fitted under said bracket and pivoted to said pitman, and having a slot in its operating arm, a keyed locking bar fitted to the other slots in the blocks and passing through the slot in the lever, one arm of the lever also extending over the other pitman, whereby when the bar is locked the parts are inseparable or non-detachable and the pitmen rendered unlockable while the bar remains locked.

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

JOHN DIEFENBACH.

Witnesses:
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