(No Model.) 2 Sheets—Sheet 1.

# G. KOENIG & S. H. STUPAKOFF.

## INTERLOCKING APPARATUS.

No. 436,360. Patented Sept. 16, 1890.

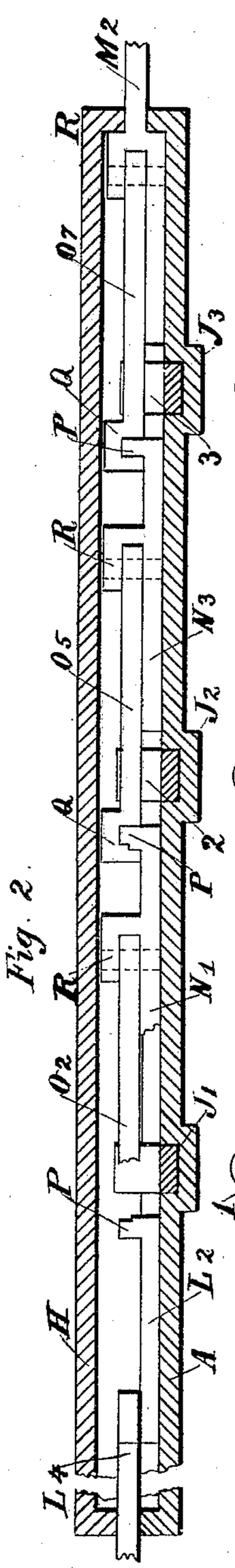


Fig. 2.

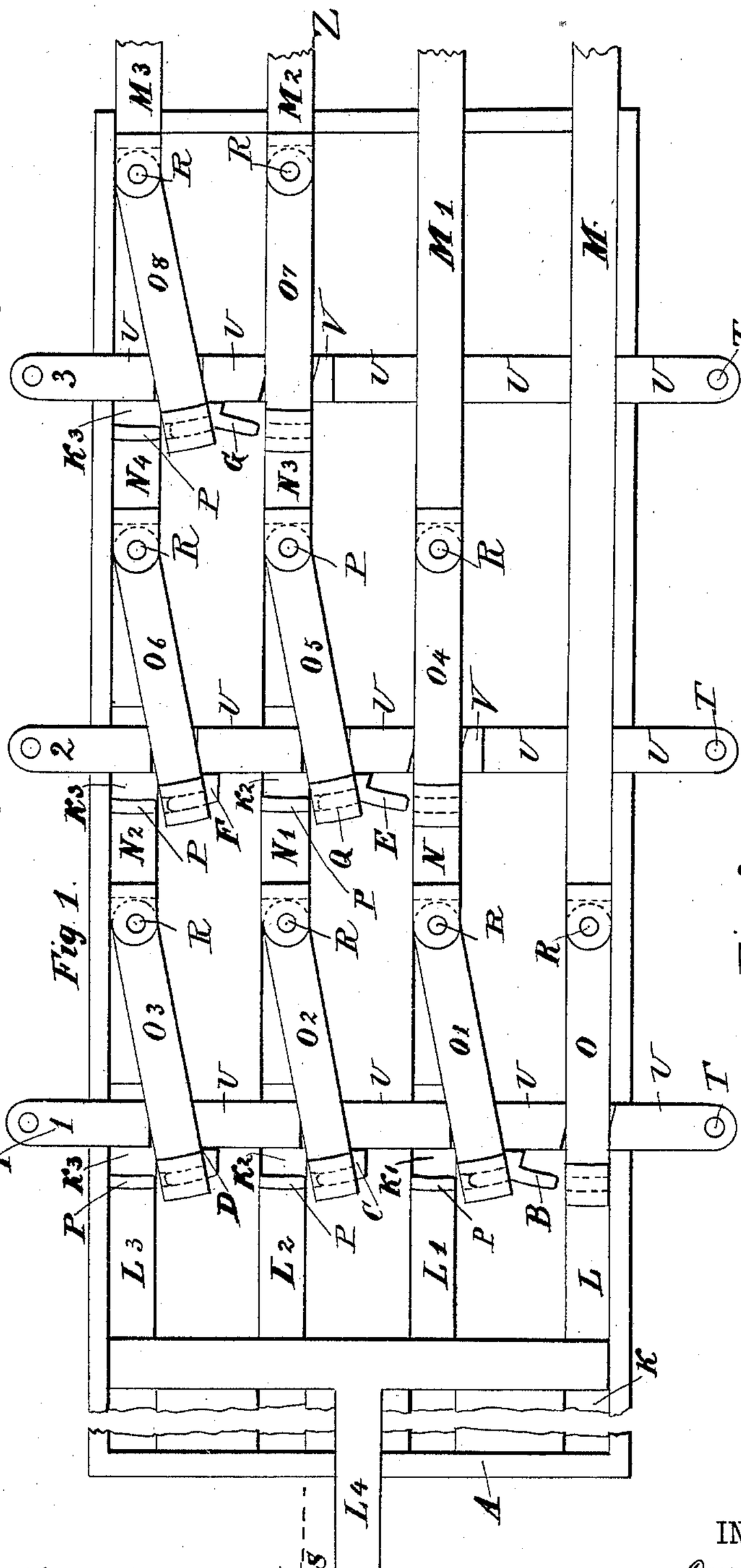


Fig. 1.


Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

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FIG. 8.

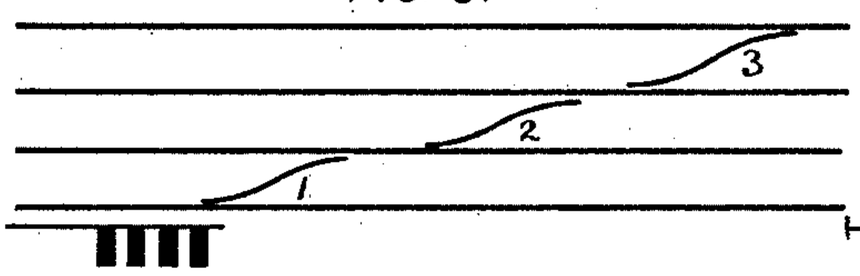


FIG. 9.

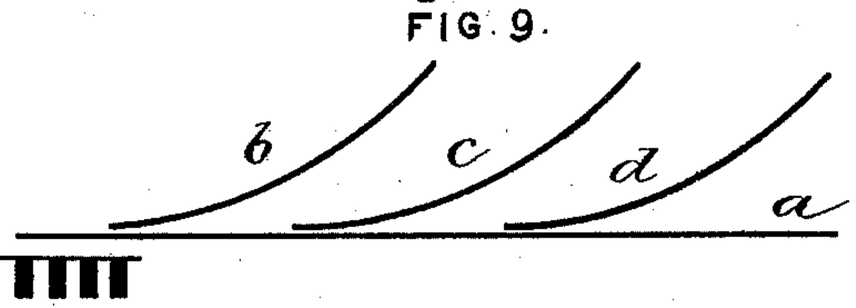


FIG. 5.

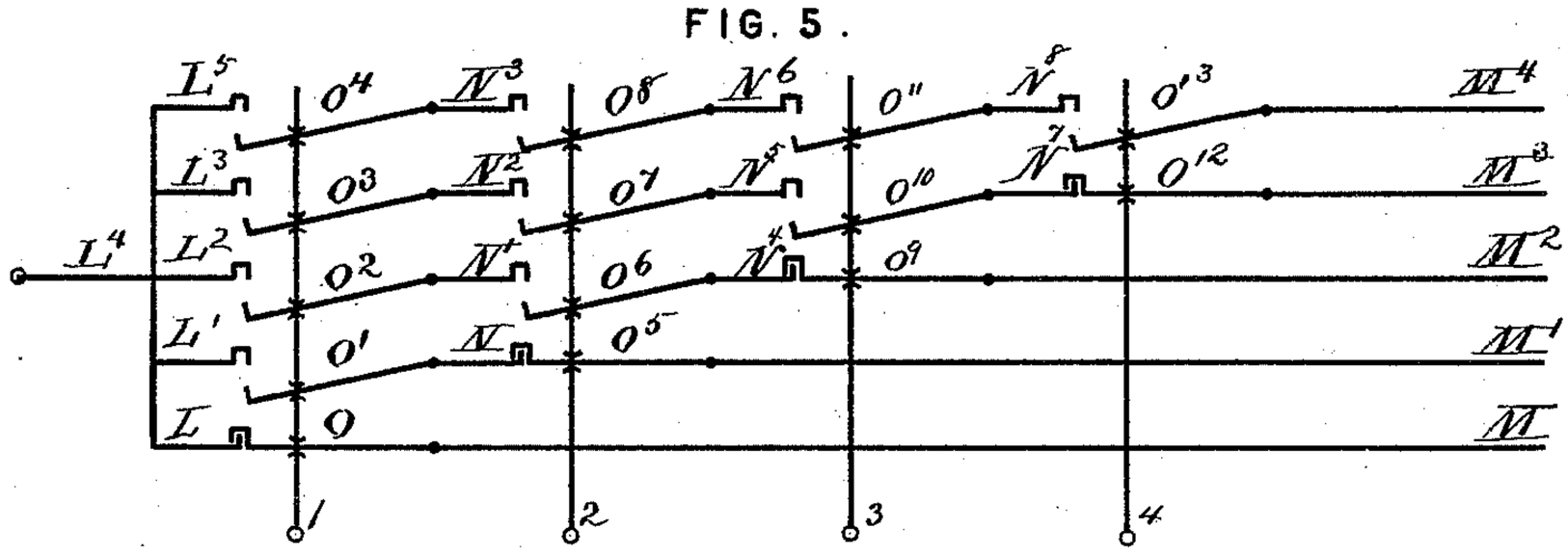


FIG. 6.

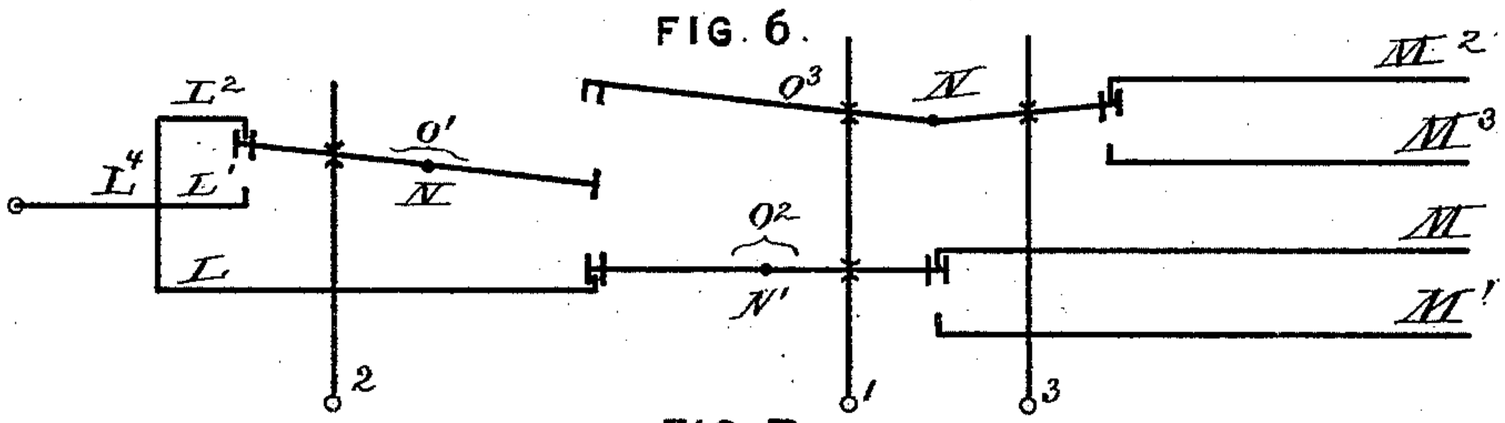


FIG. 7.

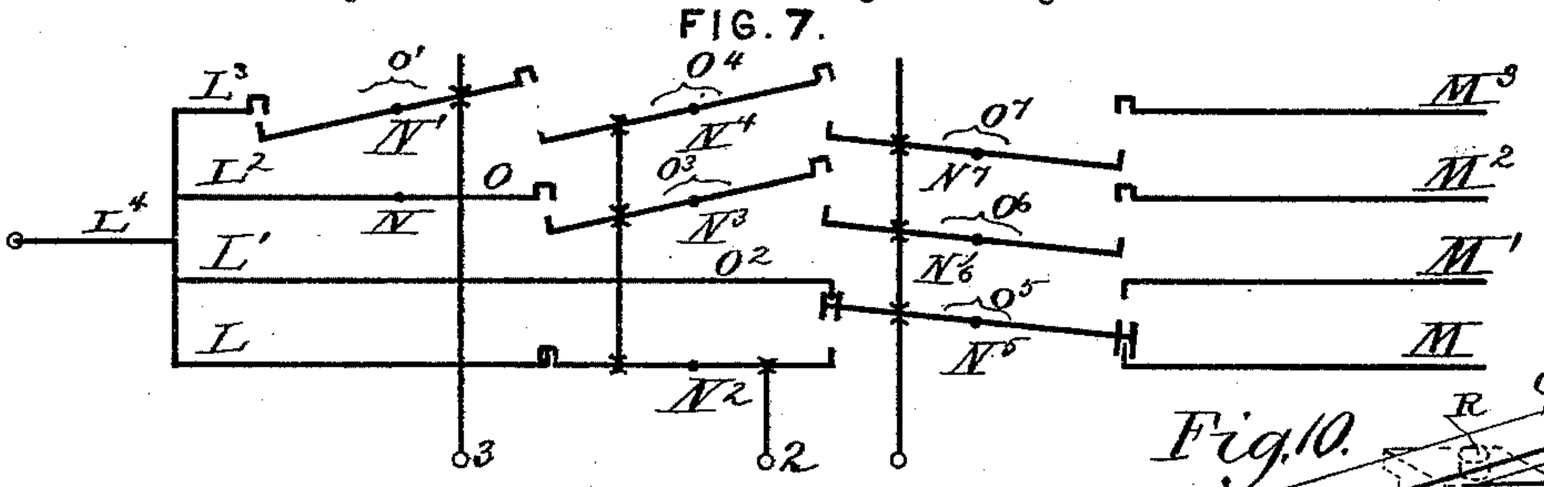


Fig. 10.

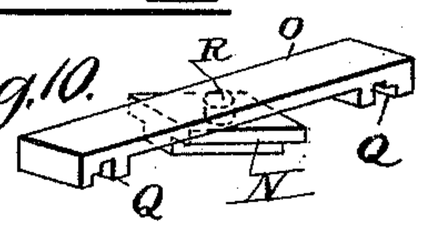


FIG. 4.

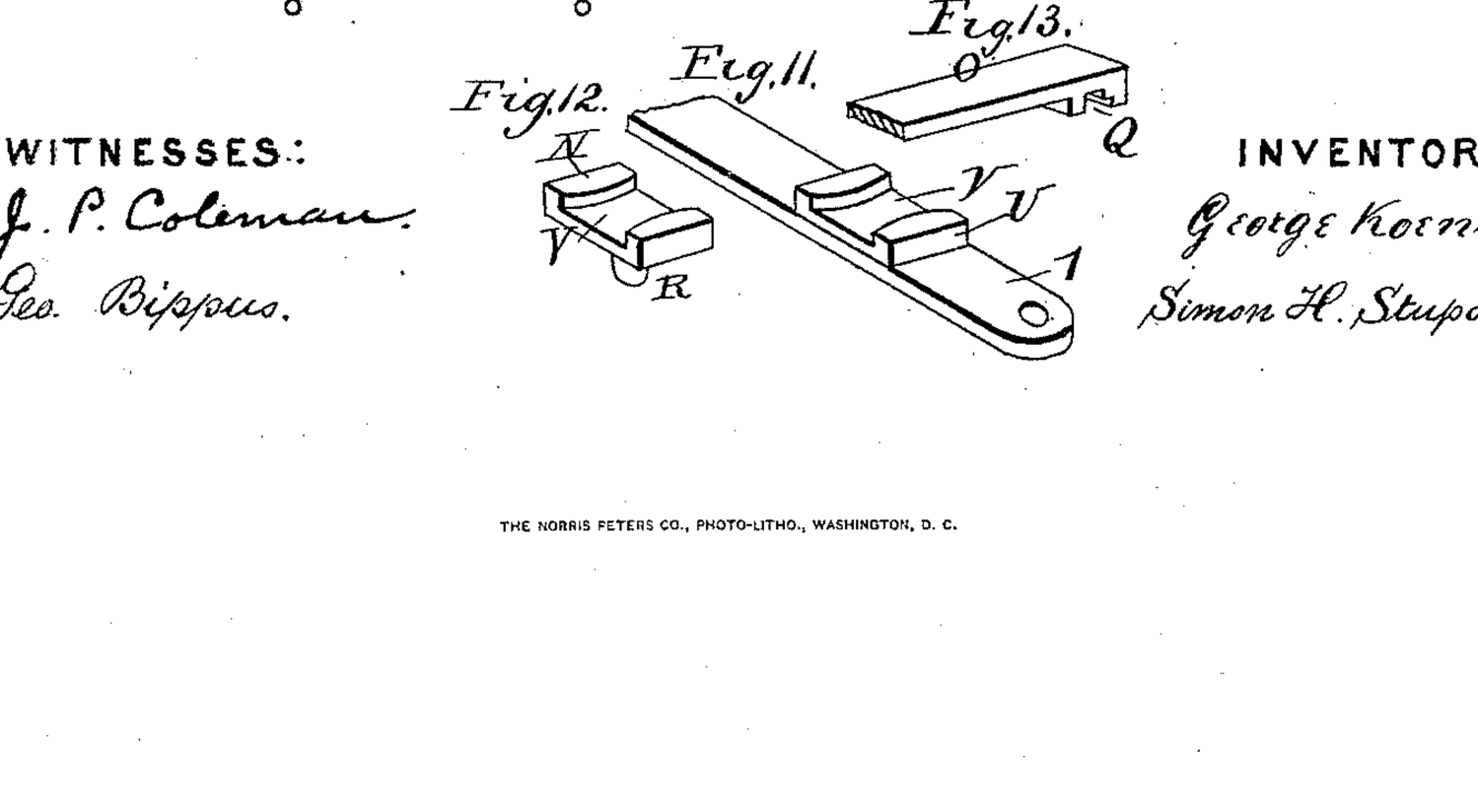


Fig. 13.




Fig. 11.




Fig. 12.




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GEORGE KOENIG AND SIMON HEINRICH STUPAKOFF, OF PITTSBURG, PENNSYLVANIA.

## INTERLOCKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 436,360, dated September 16, 1890.

Application filed April 8, 1889. Serial No. 306,433. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE KOENIG and SIMON HEINRICH STUPAKOFF, both residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Interlocking Apparatuses for Operating Railroad-Signals in Combination with Switches; and we do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

Our invention relates to a new and useful improvement in railroad safety appliances and interlocking apparatuses such as are known by the name of "selectors," the object of our invention being to produce a multiple selector or one by which the selecting of one or more blades among a number of signal-blades by a single actuating-rod and of interlocking switches and signals with each other can be accomplished in a simple and effective manner. Heretofore, so far as we are aware, this has been a matter of extreme difficulty, and, while it has been the constant endeavor on the part of those engaged in constructing interlocking apparatus, has not been accomplished save by the device patented by Johnson, No. 342,911, dated June 1, A. D. 1886, and that described and claimed in application, Serial No. 301,696, filed by us March 1, 1889, upon which this is an improvement.

In our former application, above referred to, on a selector and interlocking device we have explained and claimed parts which it will not be necessary to repeat here. We intend in the present application to dwell simply on the improvements and alterations made to our former application for Letters Patent and not shown in that case.

Figure 1 is a general plan of a four-way selector and its complete working mechanism, the top plate being omitted. Fig. 2 is a longitudinal cross-section of the same. Fig. 3 is a side elevation of the locking-bar 2. Fig. 4 is a diagram of a three-way selector. Fig. 5 is a diagram of a five-way selector. Fig. 6 is a diagram of an overlapping four-way selector. Fig. 7 is a diagram of another four-way selector. Fig. 8 is a diagram of four parallel tracks with cross-over switches, and Fig. 9 represents the diagram of a main-line track with three sidings branching off the same. In Fig. 10 we illustrate in detail the mode of coupling a double-armed oscillating rod to an intermediate piece or sliding block, which is guided in the base of the selector in longitudinal recesses, N being the sliding block and O the oscillating piece. Fig. 11 represents a combination of a switch-bar 1 with a movable guide-block U, corresponding to the upward extensions U and the spaces V between them in Fig. 3. Fig. 12 represents a movable guide-block separately, showing the pivot R, which rotates in a corresponding orifice in the switch-bar 1, as illustrated in Fig. 11. In Fig. 13 the relative position of the oscillating rod to the movable slide-block and the switch-bar of Fig. 12 is more clearly represented.

Similar letters denote like parts.

A is the base of the selector.

B, C, D, E, F, and G are vertical extensions suitably secured therein or forming part thereof, corresponding to the ∩-shaped hooks of the coupling-pieces O and serving as locks for the same.

H is the top plate of the apparatus, secured by screws (which are not shown in the drawings) to the base A.

J′ $J^2$ $J^3$ are transverse grooves, and K, K′, $K^2$, and $K^3$ are longitudinal grooves in the base, the first three for the reception of the locking or switch bars 1, 2, and 3, and the latter four for the reception of the prongs L L′ $L^2$ $L^3$ of the actuating-rod $L^4$, the signal-rods M M′ $M^2$ $M^3$ and the intermediate pieces N, N′, $N^2$, $N^3$, and $N^4$.

O, O′, $O^2$, $O^3$, $O^4$, $O^5$, $O^6$, $O^7$, and $O^8$ are coupling-pieces or connecting-links to effect a connection between the operating-rod $L^4$ and the signal-rods M.

R are pivots or pins jointing the connecting links to the signal-rods M and the intermediate pieces N, respectively.

Q are hooks proper to the connecting-links O, and P are hooks of the prongs L and the intermediate pieces N, respectively, corresponding to the hooks of said connecting or coupling links.

U are extensions of the locking-bars 1, 2, and 3, and V are spaces between such extensions.

S is a hole for the reception of a pin connecting the operating-rod to the operating signal-lever, and T are holes in the locking-bars to connect same to the rods operating the switches.

Having decribed the different parts of the selector, we will now explain how it is operated.

If used for parallel tracks, as shown in Figure 8, the requirements and the operation would be as follows:

First. In the normal position all signals stand at "danger," and all switches are open and free to move. The normal position of all parts in the selector is as shown in Fig. 1. A pulling of the operating-rod $L^4$ reverses the signal connected to sliding bar M from the "danger" to the "safety" position and locks switch connected to bar 1 in the normal position, leaving switches 2 and 3 free to be moved. The signals governed by and connected to sliding bars M′, $M^2$, and $M^3$ are locked in their "danger" position.

Second. If the switch connected to locking-bar 1 be reversed, a pulling of the actuating-rod will operate the signal connected to the sliding bar M′, lock switch-bar 1 in the reversed switch-bar 2 and signal-rods M, $M^2$, and $M^3$, in the normal position, leaving switch connected to bar 3 free to be moved.

Third. If switch-bars 1 and 2 are reversed, a pulling of $L^4$ places the signal connected to $M^2$ in the "safety" position, locks switch-bars 1 and 2 in the reversed and 3 M M′ $M^3$ in the normal position.

Fourth. If switch-bars 1, 2, and 3 are reversed, a pulling of $L^4$ operates the signal connected to $M^3$, placing it in the "safety" position, locks all switches in the reversed and the remaining signals M, M′, and $M^2$ in their normal or "danger" position.

If used for a track, as shown in Fig. 9, the requirements of the selector would be as follows:

First. In their normal position all signals indicate "danger" and all switches are set for the straight line of the track. In this case the normal position of the switch or locking-bars 1, 2, and 3 is the reverse of the one shown in Fig. 1. A pulling of the operating signal-rod $L^4$ will indicate a clear track for the straight line to *a* by the "safety" position of the signal connected to $M^3$, the signal-rods M M′ $M^2$ and switch-bars 1, 2, and 3 being all locked in their normal position.

Second. A reversing of the switch connected to bar 3 will change the combination in the selector in such a way that a pulling of the rod $L^4$ will place the signal connected to $M^2$ to its "safety" position, indicating a clear track to the siding *b*. The switch-bars 1 and 2 and the signal-bars M, M′, and $M^3$ will be locked in their normal and switch-bar 3 in the reversed position.

Third. A reversing of the switch-bar 2 and pulling of the actuating-rod $L^4$ will indicate a clear track to *c* by the "safety" position of the signal-blade connected to M′. Signal-rods M $M^2$ $M^3$ and switch-bar 1 will be locked in the normal and switch-bar 2 in the reversed position, while the switch connected to 3 is free.

Fourth. A reversing of switch 1 and pulling of rod $L^4$ will indicate a clear track for the siding *d* by the "safety" position of the signal-blade connected to M. Switch 1 is locked in the reversed position, while switches 2 and 3 are free and signals M′, $M^2$, and $M^3$ are locked in their normal or "danger" positions.

Whether used for parallel tracks connected by a series of cross-over switches, as shown in Fig. 8, or for a straight track with several branches or sidings, as shown in Fig. 9, our selector demands, in accordance with the existing rules of railroad signal service, that the signal-operating rod $L^4$ assume its normal position, and consequently all signal-blades indicate a "danger" position before a new combination can be made. The locking of switches and signals in this particular construction of our selector is effected in the following manner: The vertical projections B, C, D, E, F, and G, forming part of or being properly secured to the base A, lock the connecting or coupling pieces O to the base by means of their hooks Q, if they should not be in a straight line with the prongs L L′ $L^2$ $L^3$ of the operating-rod $L^4$, preventing thereby a reversing of the signal-blades connected to the sliding bars M, M′, $M^2$, and $M^3$. The lower part of the intermediate pieces N, being guided in the longitudinal grooves K, and, as shown in Figs. 1 and 2, extending from their jaws toward the operating-rod $L^4$, will effect a locking of the switch or locking bars 1, 2, and 3 by entering into their grooves V.

The engagement or the disengagement of the rods M with the operating-rod L, through the coupling-links O and the intermediate pieces N, is effected by an oscillating movement of the coupling-links and their hooks or equivalent terminals, corresponding to the terminals of the sliding rods, the intermediate pieces, and the prongs of the operating-rod.

For the purpose of obtaining a long stroke with comparatively short pieces we apply differently-shaped hooks at the terminals of the oscillating pieces and correspondingly differently-shaped locking-pieces, as illustrated in Fig. 2, thus permitting the hooks Q to pass the locking-pieces B, C, D, E, and F, but preventing a change in the combination unless the operating signal-rod does actually occupy its normal position.

The difference in the shape of the hooks serves for the following purpose:

Suppose the switch-bars 1, 2, and 3 are reversed and the operating-rod $L^4$ is moved a distance equal to the distance between the centers of the switch-bars. Then the hook Q of the oscillating rod $O^6$ and the hook Q of the oscillating rod $O^5$ will occupy positions di-

rectly opposite the locking-pieces D and C, respectively. At the same time the hook Q of the oscillating rod $O^8$ will stand opposite the locking-piece F. Should the hooks of all pieces be of the same shape, suitable for engagement, there would be nothing to prevent the switch-bars 1 and 2 from being moved to their normal positions. In this case the signal connected to the signal-rod $M^3$ would occupy an intermediate position, which easily might be taken for the "safety" position, while the very switch controlled by this signal would be in a relatively wrong position.

Suppose locking-bars 1 and 2 are reversed and the operating-rod $L^4$ is moved a distance equal to the space between the centers of the switch-bars. Then the hooks Q of the oscillating rods $O^5$ and $O^6$ will occupy positions directly opposite the locking-pieces C and D, and the hook Q of the locking-piece $O^7$ will be located directly opposite the locking-piece E, and for the same reason, as mentioned above, the switch-bars 1 and 2 could be restored to their normal positions while it is required that they should remain locked in their reversed positions.

In a third case, when the locking-bar 1 is reversed and the operating-rod $L^4$ is moved a distance equal to the space between the centers of the switch-bars, then the hook Q of the oscillating rod $O^4$ will occupy a position directly opposite the locking-piece B, and if shaped in such a way as will permit their engagement the locking-bar 1 could be restored to its normal position.

Figs. 1, 2, 3, 4, 5, 6, and 7 illustrate various ways of constructing and applying the coupling-links and show how they may be provided with a pivot at one end or at or near the center, how they may be single or double armed, swing either toward the signal-rods or toward the operating-rod, and how they may be provided at one or both ends with clutches, which may engage with the corresponding parts of the prongs, the intermediate pieces, or the signal-rods either vertically or horizontally.

In Fig. 4 we illustrate a selector—such as would be required for three parallel tracks or for a straight track—with only two sidings. In this diagram it is shown how the same results may be obtained by reversing some of the connecting-links in such a way that their pivots are placed toward the operating-rod and their clutches toward the signal-rods.

In Fig. 5 a five-way selector is illustrated—such as would be required for five parallel tracks—with four cross-over switches or for a track with four sidings. The arrangement of parts is shown in exactly the same way as in the four-way selector in Fig. 1. We deem it superfluous to enter into a specific description of this diagram, as it will suggest itself from the explanation of Figs. 1, 2, and 3. The diagram of this five-way selector and the one of the three-way selector in Fig. 4 are merely added to illustrate that we are by no means restricted to a four-way selector and actually to show how our device is equally adapted to operate more or less signals and switches.

The diagram in Fig. 6 shows a further modification of our device, in which it was our object to reduce the number of parts in the best possible way. In this case we require not more than three intermediate pieces carrying the pivots of the coupling-links to the same, as illustrated in Figs. 10, 11, 12, and 13 in detail, and, further, we apply two double and two single armed coupling-links with clutches at either end, thus also reducing the couplings to a minimum. This construction naturally involves a change in the order of the signal-rods as well as in the order of the switch-rods, which, however, does in no way interfere with the working of the signals and the switches in their proper order, providing the connections are made according to the requirements. We have termed this arrangement an "overlapping selector," as the rods overlap each other and do not proceed in a continuous order.

In Fig. 7 we illustrate another modification of our selector, in which the rods continue in a distinct rotation, but in which we apply exclusively connecting-links pivoted in the center and provided with hooks, eyes, or clutches at both ends.

In the present application it will be noticed that several points have been worked out.

First, the improvements we have made over our prior application for a similar interlocking device, consisting in securing the intermediate pieces to the coupling-pieces by pivots.

The second improvement is that the locking-pieces for the signal-bars form a part of the base or are properly secured to the same.

Third, another improvement is the application of an oscillating movement of the parts engaging within each other.

Fourth, the improvement in variously shaping the clutches such as will permit a long stroke of the operating parts.

A fifth improvement in this construction is the possibility of reducing the number of operating parts to a minimum, as illustrated in the overlapping selector.

In the present application some points are not explained nor claimed, because they form part of the prior application now pending.

Having described the different parts of our invention, we claim as new, and desire to secure by Letters Patent, the following:

1. In a multiple selector, the combination, with a switch or switches controlling two or more railway-tracks and signals therefor, of a connecting-rod for working all said signals, a series of signal-bars, one for each signal, formed of a series of pivotally-connected coupling-links adapted to be broken or disconnected by reciprocating at right angles thereto, and a number of bars corresponding and connected with said switch or switches,

whereby the engagement of either of said signal-bars with said connecting-rod and the disengagement of all the others are effected, substantially as and for the purpose set forth.

2. In a multiple selector, the combination, with a series of tracks and a signal for each, of a connecting-rod for working a series of signals, a series of signal-bars formed of a number of pivotally-connected oscillating coupling links or pieces provided at one end with prongs or clutches, and a series of switch-bars, one for each switch or crossing, operating at right angles to said signal-bars for producing or controlling the engagement and connection of either of said signal-bars with said connecting-rod and the disengagement of all the others, substantially as and for the purpose herein set forth.

3. In a multiple selector, the combination, with a series of tracks and signals for each, of a base having a series of transverse grooves or channels, a series of signal-bars, one for each signal, formed of a number of pivotally-connected oscillating coupling-pieces provided with clutches or prongs adapted to be reciprocated in said longitudinal grooves, and a series of switch-bars corresponding and connected with said switch or switches adapted to be reciprocated in said transverse grooves, whereby the engagement and connection of the coupling-pieces of either of said signal-bars with the prongs of said connecting-rod and the disengagement of all the others are effected, substantially as and for the purpose herein set forth.

4. In a multiple selector, the combination, with a series of tracks and a signal for each, of a base or frame having a number of vertical projections and a series of longitudinal and transverse grooves, a series of signal-bars, one for each signal, formed of a number of pivotally-connected oscillating coupling-pieces provided with prongs adapted to be reciprocated in said longitudinal grooves, and a series of switch-bars, one for each switch, the first of which, or that nearest the actuating-rod, is provided with a number of grooves, each bar thereafter being provided with one less than the one preceding, said bars being adapted to be reciprocated in said transverse grooves, whereby the engagement and connection of the coupling-pieces of either of said signal-bars with the prongs of the connecting-rod and the disengagement of all others and the locking of said switch and signal bars are effected, substantially as and for the purpose herein set forth.

5. In a selector, the combination of the oscillating connecting-links with the signal-bars, the switch-bars, the intermediate sliding pieces, the prongs of the operating-rod, and the locking-pieces of the base.

In testimony that we claim the foregoing we hereunto affix our signatures this 30th day of March, A. D. 1889.

GEORGE KOENIG.
SIMON HEINRICH STUPAKOFF.

In presence of—
JAMES BRYAR,
J. B. HYNDMAN.