

(No Model.)

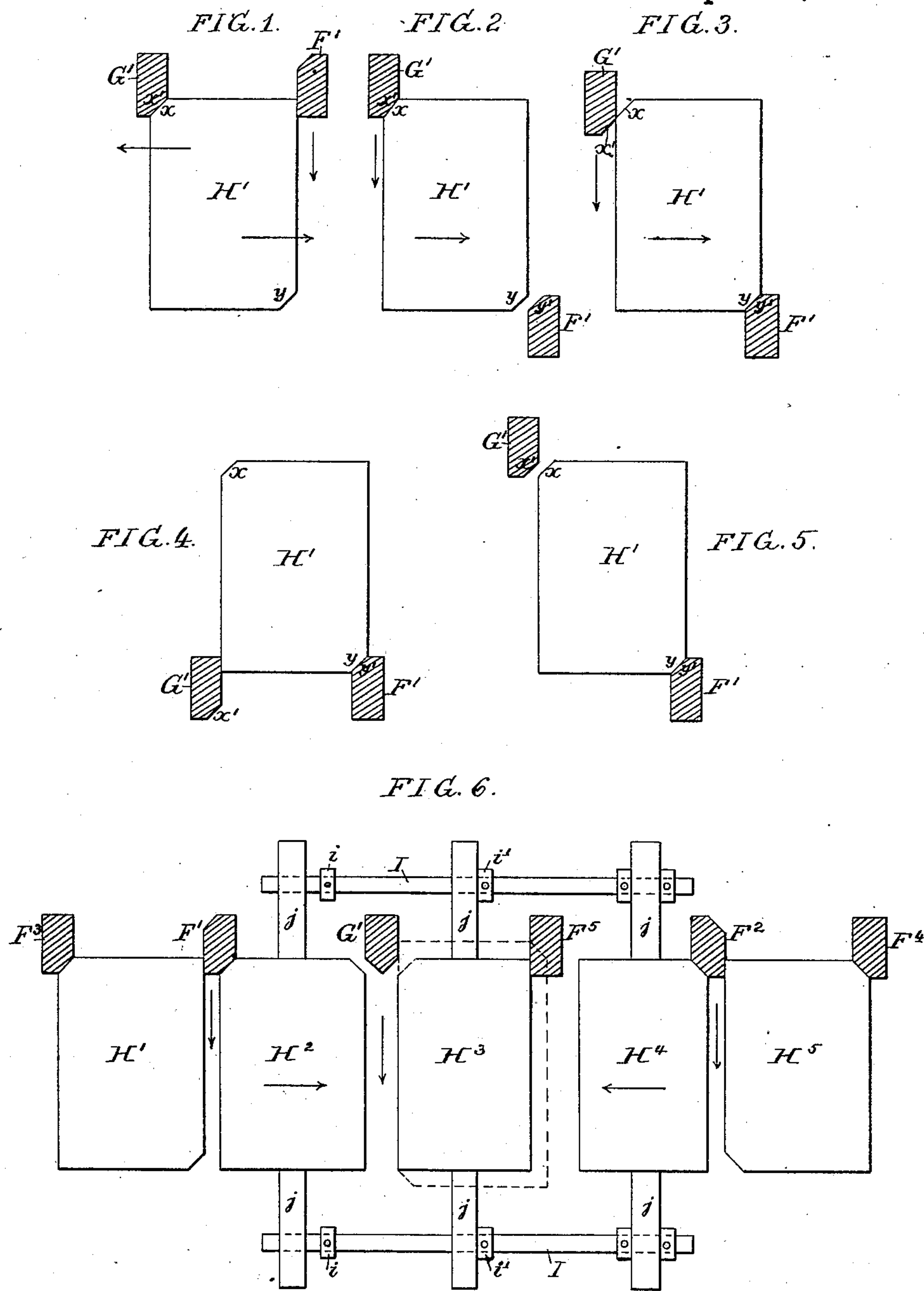
5 Sheets—Sheet 1.

E. H. JOHNSTON.

# INTERLOCKING SWITCH AND SIGNAL MECHANISM FOR RAILWAYS.

No. 349,161.

Patented Sept. 14, 1886.



Witnesses  
John M. Clayton.  
James F. Johns

Inventor  
Edward H. Johnston  
by his Attorneys  
Howson & Sons

(No Model.)

5 Sheets—Sheet 2.

E. H. JOHNSTON.

INTERLOCKING SWITCH AND SIGNAL MECHANISM FOR RAILWAYS.

No. 349,161.

Patented Sept. 14, 1886.

FIG. 7.

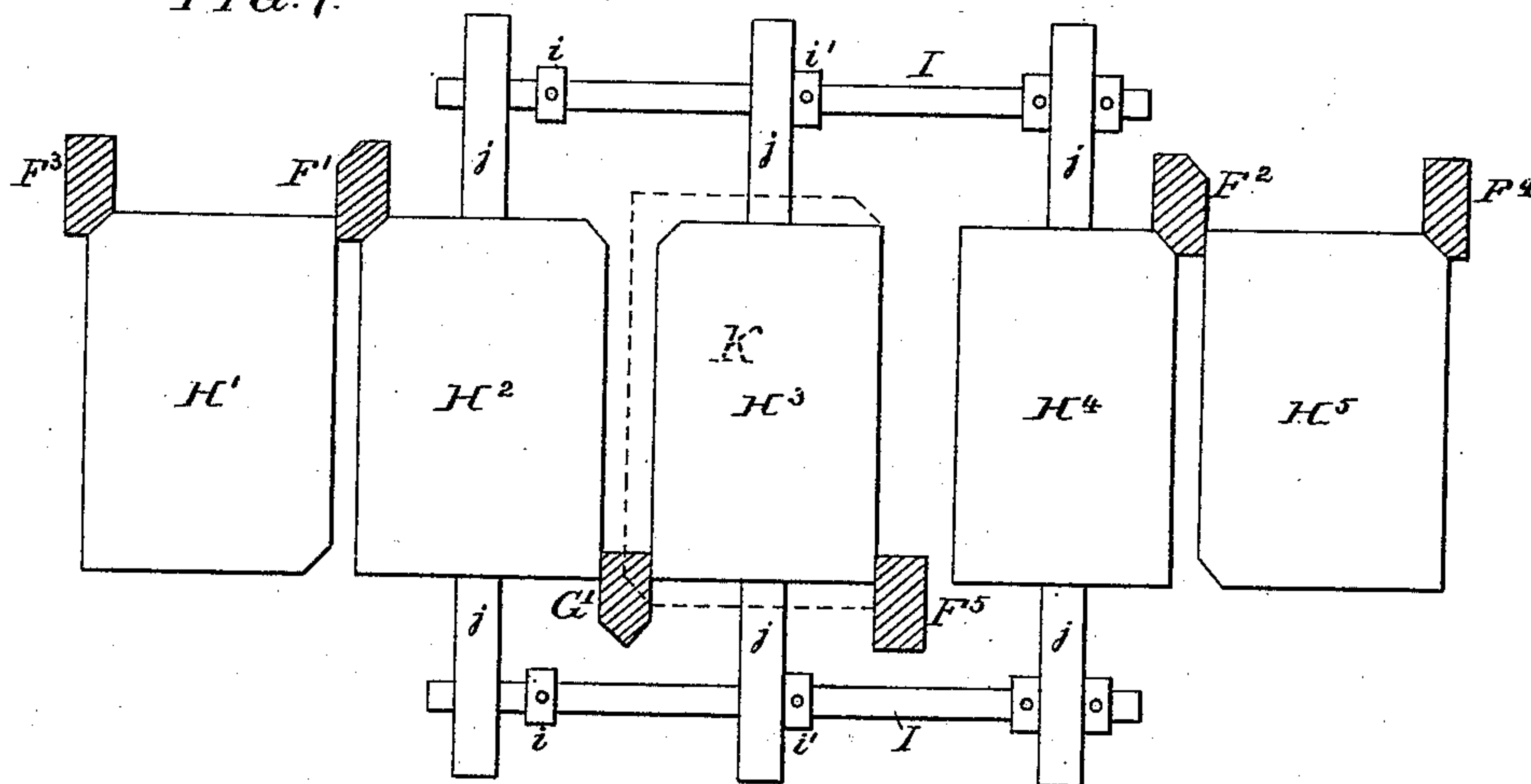


FIG. 8.

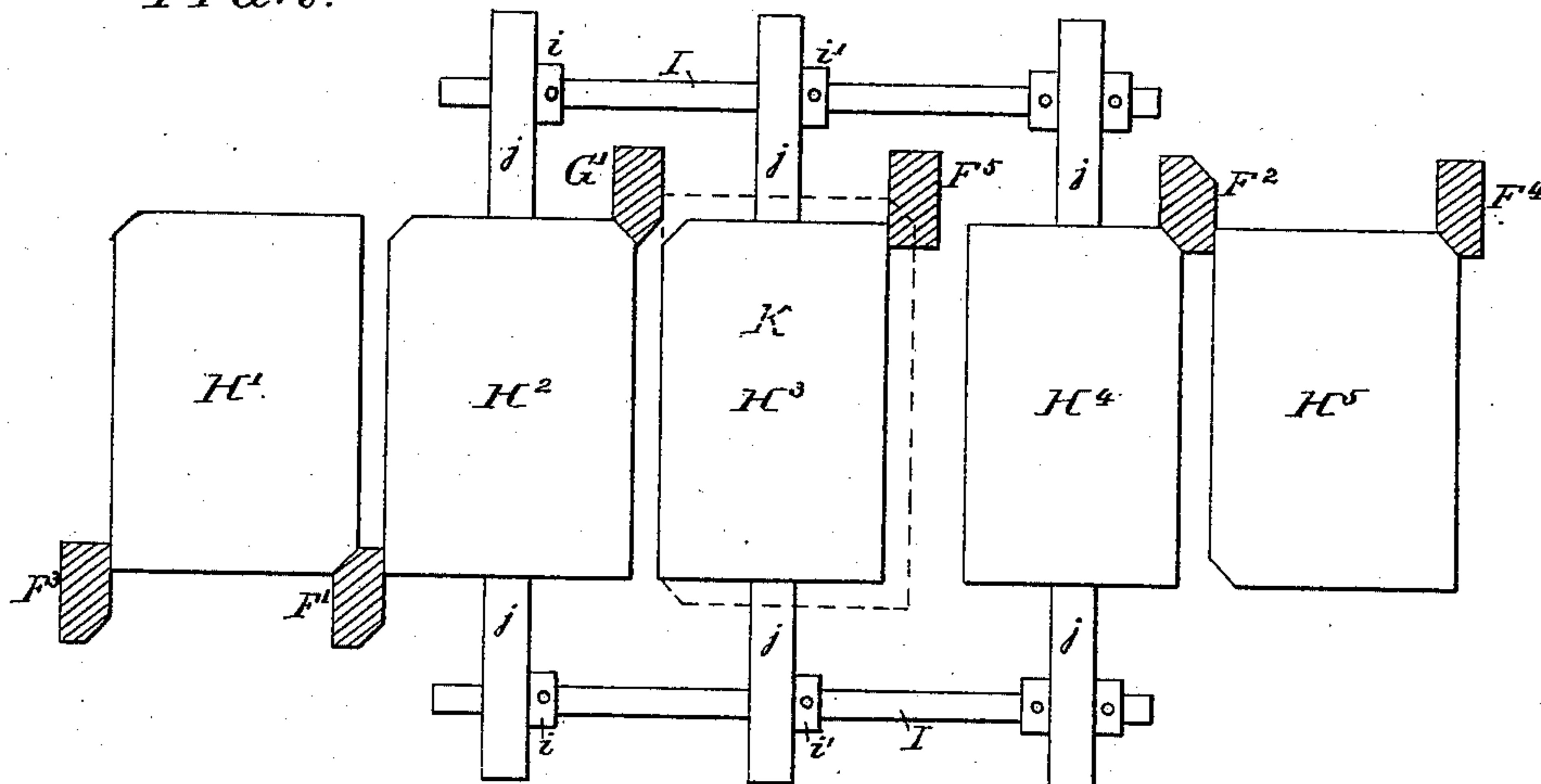
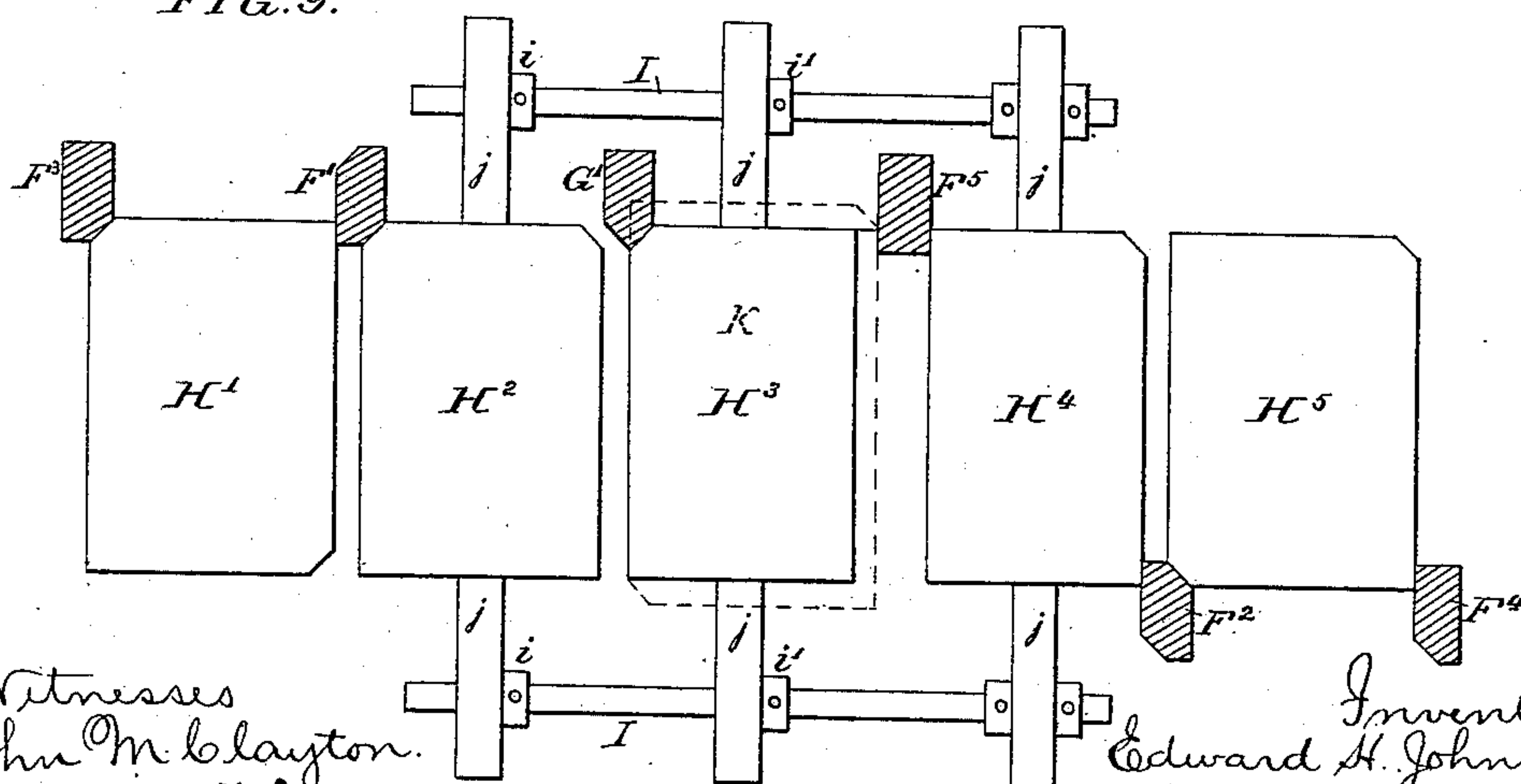


FIG. 9.



Witnesses  
John M. Clayton.  
James F. Johns

Inventor  
Edward H. Johnston  
by his Attorneys  
Howson & Sons

(No Model.)

5 Sheets—Sheet 3.

E. H. JOHNSTON.

INTERLOCKING SWITCH AND SIGNAL MECHANISM FOR RAILWAYS.

No. 349,161.

Patented Sept. 14, 1886.

FIG. 14.

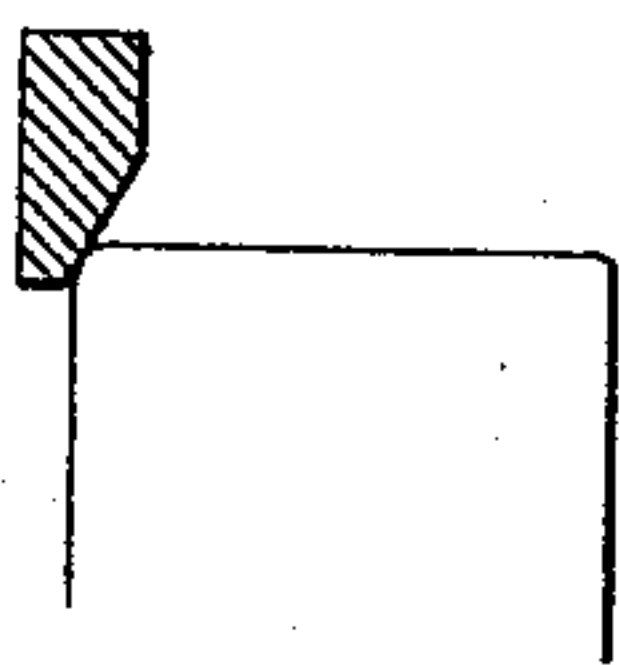


FIG. 15.

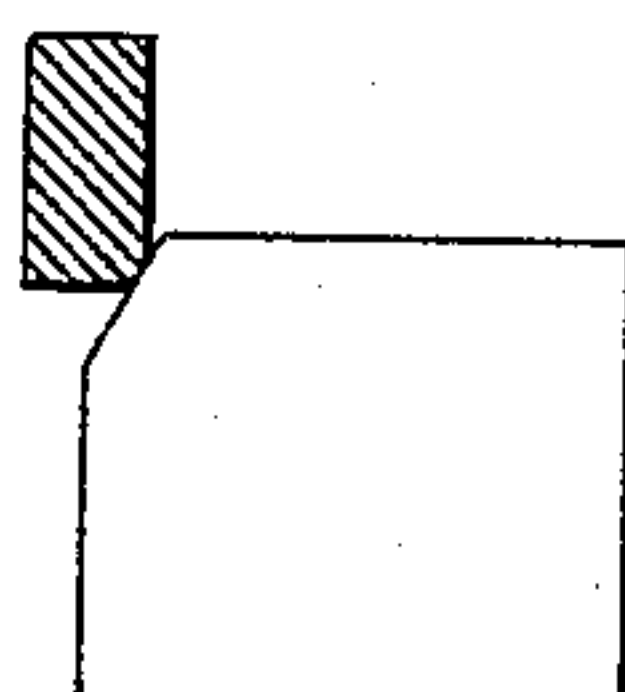
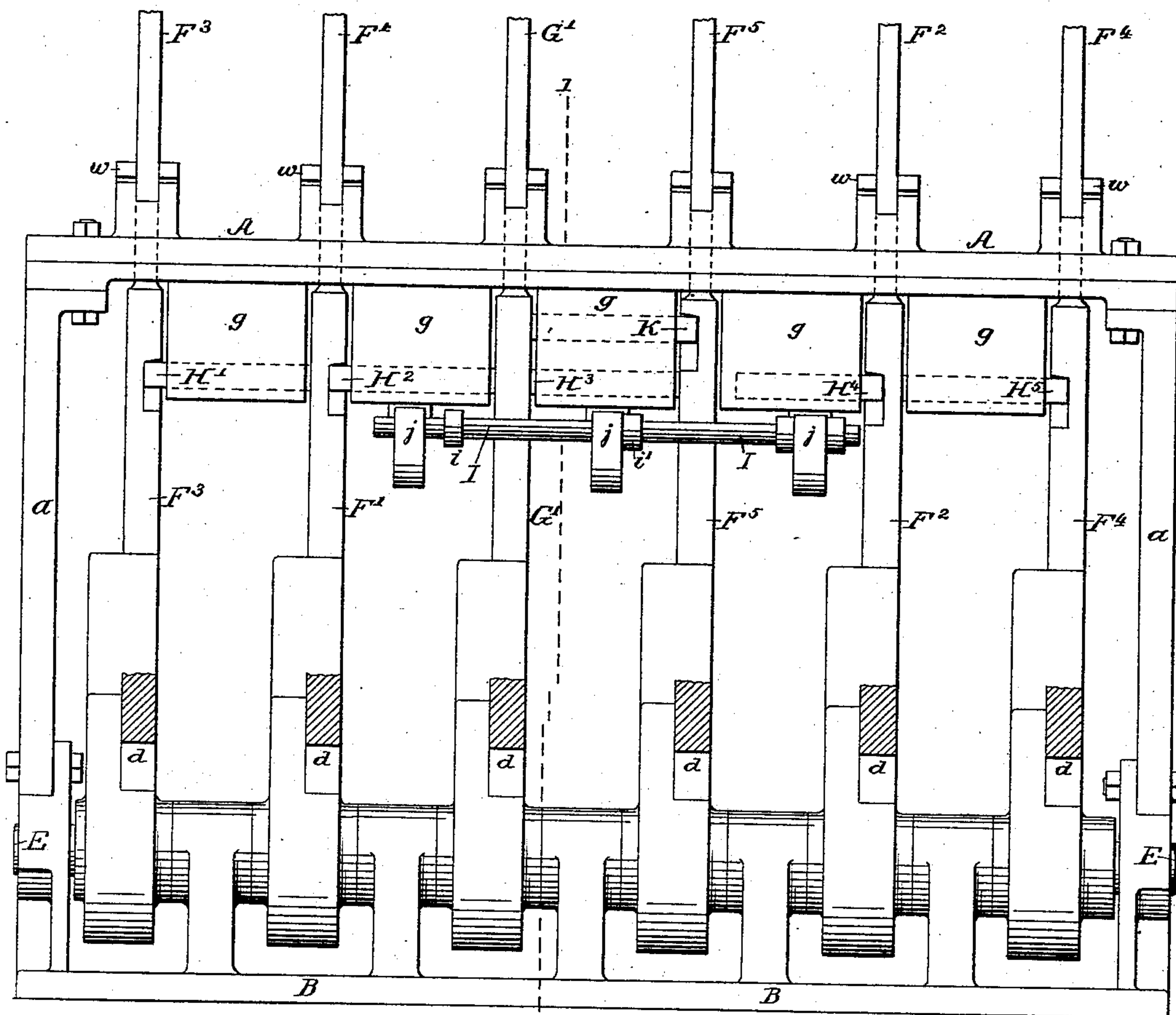


FIG. 10.



Witnesses:  
John M. Clayton,  
James F. Jobin

Inventor  
Edward H. Johnston  
by his Attorneys  
Hobson & Sons



(No Model.)

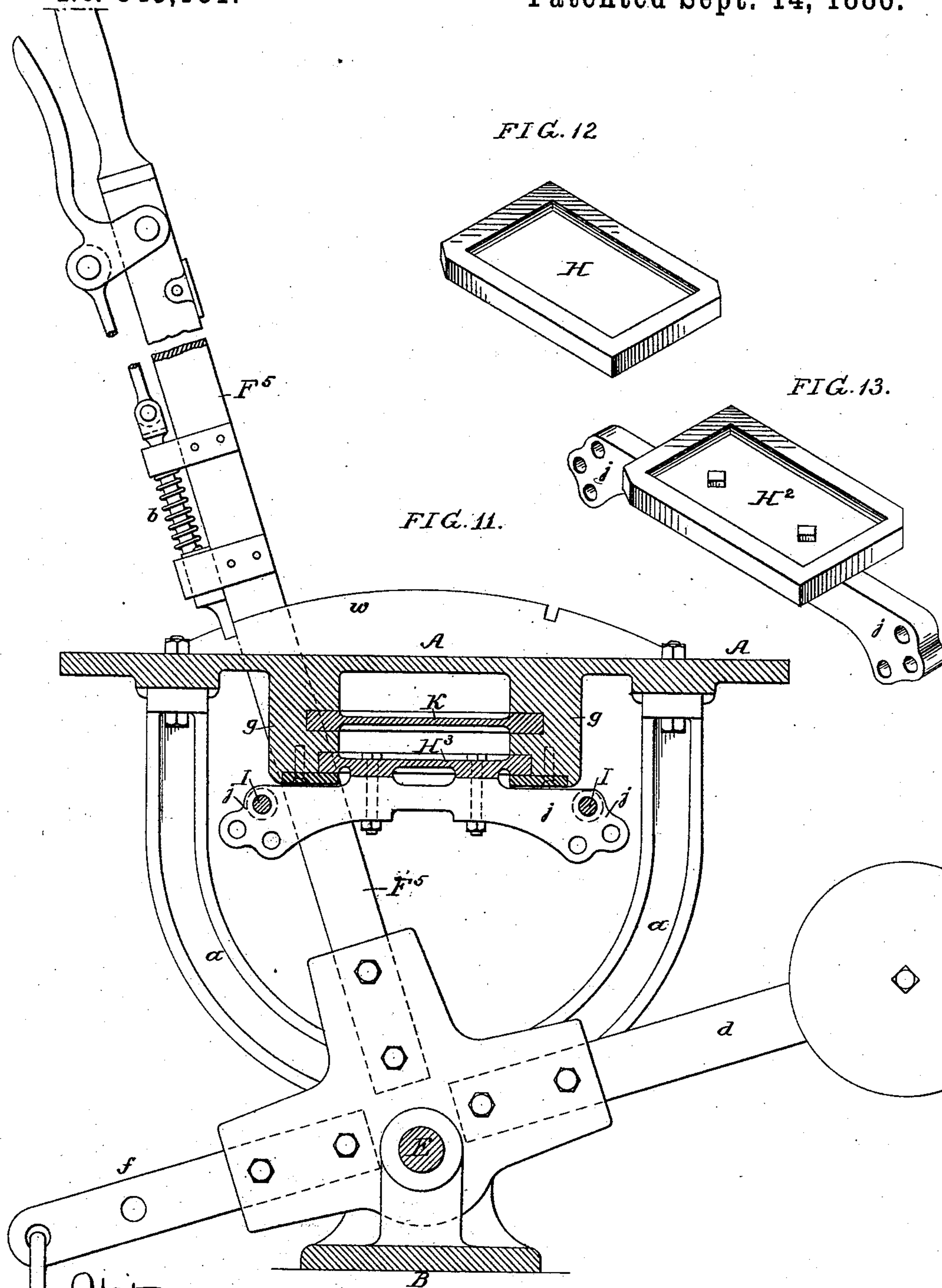
5 Sheets—Sheet 4.

E. H. JOHNSTON.

INTERLOCKING SWITCH AND SIGNAL MECHANISM FOR RAILWAYS.

No. 349,161.

Patented Sept. 14, 1886.



Witnesses  
John M. Clayton  
James F. Tobin

Inventor.  
Edward H. Johnston  
by his Attorney  
Hobson & Sons

(No Model.)

5 Sheets—Sheet 5.

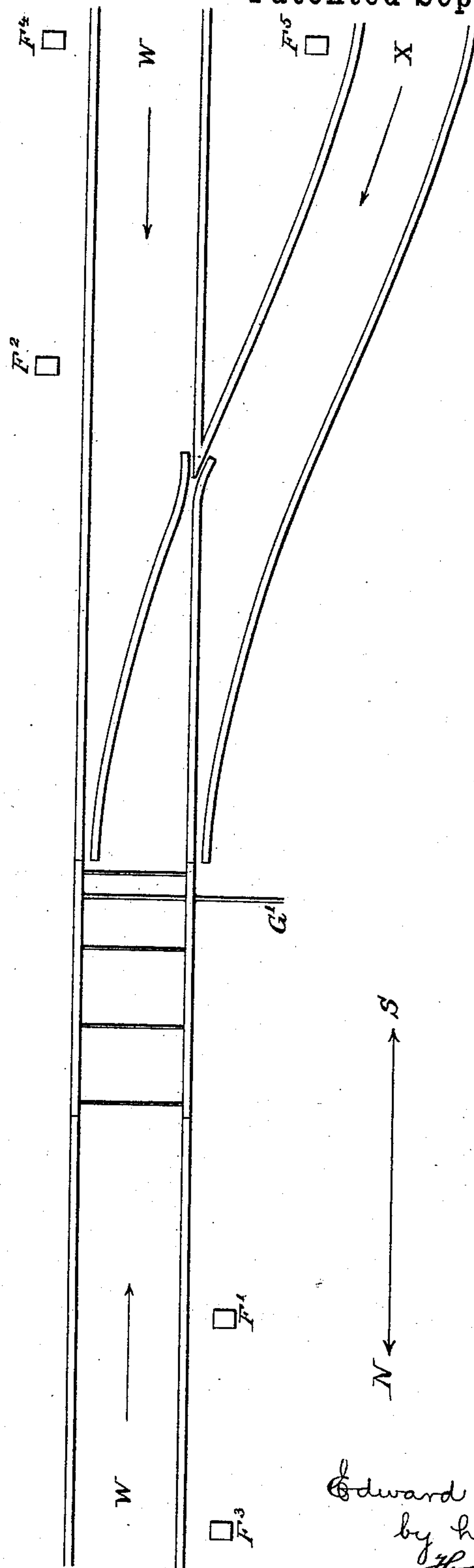
E. H. JOHNSTON.

INTERLOCKING SWITCH AND SIGNAL MECHANISM FOR RAILWAYS.

No. 349,161.

Patented Sept. 14, 1886.

FIG. 16.



Witnesses:  
John M. Clayton.  
James F. Johns

Inventor  
Edward H. Johnston  
by his Attorney  
Howson & Sons



# UNITED STATES PATENT OFFICE.

EDWARD H. JOHNSTON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
THE WHARTON RAILROAD SWITCH COMPANY, OF SAME PLACE.

## INTERLOCKING SWITCH AND SIGNAL MECHANISM FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 349,161, dated September 14, 1886.

Application filed May 15, 1884. Serial No. 131,536. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD H. JOHNSTON, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Interlocking Switch and Signal Mechanisms for Railways, of which the following is a specification.

My invention consists of mechanism, fully described and claimed hereinafter, for operating switches and danger-signals on railways; and the object of my invention is to prevent the opening of the switch, and the consequent interruption of the continuity of the main track without first giving the danger-signal, and to prevent the giving of the safety-signal without first closing the switch, and thereby restoring the main track to a condition for the travel of trains thereon.

In the accompanying drawings, Figures 1, 2, 3, 4, and 5, Sheet 1, are diagrams illustrating my invention in its simplest form in connection with one switch-lever and one signal-lever, these levers being shown in section; Fig. 6, a plan view showing my invention on a more extended scale; Figs. 7, 8, and 9, Sheet 2, the same as Fig. 6, but showing some of the operating parts in positions differing from that in said figure; Fig. 10, Sheet 3, a front view, partly in section, of Fig. 6; Fig. 11, Sheet 4, a vertical section on the line 1 2, Fig. 10; Figs. 12 and 13, detached perspective views of parts of Fig. 11; Figs. 14 and 15, Sheet 3, views illustrating modifications of parts of my invention, and Fig. 16, Sheet 5, a diagram showing a single track and siding, illustrating the application of the system of switch and signal mechanism shown in Figs. 6 to 11.

A preliminary understanding of my invention may be best acquired by a description of the diagrams, Figs. 1, 2, 3, 4, and 5.

H' is a plan view of a plate which can be moved to and fro in guides in the direction indicated by arrows in Fig. 1, G' a lever connected to ordinary switch-rails, and F' a lever connected to a signal indicating the condition of the switch. When these parts are in the relative positions shown in Fig. 1, the continuity of the main track is unbroken, and the switch-lever G' is locked in place by the signal-lever F' through the medium of the

plate H', the signal indicating a clear track. When the signal-lever F' has been moved to the point shown in Fig. 2, the plate H' will be at liberty, the switch-lever G' can be moved in the direction of the arrow, Fig. 3, and the beveled edge  $x'$  of this lever, acting on the beveled corner  $x$  of the plate, will at once move the latter in the direction of the arrow, Fig. 3, until the beveled corner  $y$  of the plate H' is in contact with the beveled edge  $y'$  of the lever F'. It will thus be seen that the signal must be moved to the position indicating "danger" by the operation of the lever F' before the switch-rails can be moved to coincide with the rails of a siding or turn-out, and that the signal-lever F' will be locked by the plate H' as soon as the first movement is imparted to the switch-lever, this locking of the signal-lever being continued as the movement of the switch-lever is continued, and after it reaches its destination, as shown in Fig. 4. When the lever is in this position, the continuity of the main track is interrupted, the switch-rails coinciding with those of the siding. When the switch has to be returned to its first position to restore the continuity of the main track, the lever G' must be moved from the point shown in Fig. 4 to that seen in Fig. 5, when the plate H' will be at liberty, and the signal-lever F' and the plate H' can be moved to their first positions. (Shown in Fig. 1.) However, it will be seen that there can be no signaling indicating the restoration of the continuity of the main track until the switch has been actually operated to reduce the track to that condition.

Many different combinations of switch-levers, signal-levers, and sliding plates may be adopted according to the number of switches to be operated from one locality; but it will suffice to describe the system of plates and levers illustrated in Figs. 6 to 11, with the diagram Fig. 16, which illustrates a single track and siding. A frame-work consisting, in the present instance, of the table A, two end frames,  $a$   $a$ , and base B, Figs. 10 and 11, is secured to the floor of a switch-house, and to this frame-work is secured a long pivot-pin, E, to which are hung a number of operating-levers, G' F' F<sup>2</sup> F<sup>3</sup> F<sup>4</sup> F<sup>5</sup>, in the order shown in Fig. 10, one lever, F<sup>5</sup>, only being shown in Fig. 11.



Each of the levers has a weighted arm, *d*, and an arm, *f*, which is connected by any suitable rods or levers to the signaling device or switch. Of the series of levers shown in Figs. 6 to 10, the one marked *G'* is connected to a switch, and each of the levers *F'* to *F<sup>5</sup>* to a signal. Each of these levers is provided with a spring-bolt, *b*, adapted to notches in a segment, *w*, on the table *A*, so that each may be locked in either of the two positions to which it may be moved. These locking-bolts *b* are similar to those used on ordinary switch-levers and on locomotive starting-bars; but it will be understood that it is not essential to my invention to adhere to these locking devices shown in the drawings. To guiding-grooves in ribs *g* on the under side of the table *A*, Fig. 11, are adapted a series of plates, *H'* *H<sup>2</sup>* *H<sup>3</sup>* *H<sup>4</sup>* *H<sup>5</sup>*, which, as in the case of the plate *H'* in Fig. 1, can be moved to and fro in the said grooves, the plates alternating with the levers, as shown in Fig. 6. To suitable guides, above the plate *H<sup>3</sup>*, in the present instance, is adapted a plate, *K*, operating in connection with the levers *G'* and *F<sup>5</sup>*, as described hereinafter. Rods *I* *I* are connected to projections *j* on the plate *H<sup>4</sup>*, and pass freely through projections *j* on the plates *H<sup>2</sup>* and *H<sup>3</sup>*, the rods being provided with collars *i* *i'*, the purport of which will be explained hereinafter.

In the diagram, Fig. 16, *W* represents the single track and *X* the siding, this arrangement occurring where a road has partly a double and partly a single track, the siding being used only by trains going north, while the main track is used by trains going both north and south. Only one switch is required in this combination; but five signals are required, the switch being lettered *G'* and the signals *F'* *F<sup>2</sup>* *F<sup>3</sup>* *F<sup>4</sup>* *F<sup>5</sup>*. Normally all the signals are set at "danger;" but the switch-lever *G'* and signal-levers *F'* *F<sup>2</sup>* can be moved, all other of the levers being locked; but when either one of these levers *G'* *F'* *F<sup>2</sup>* is moved it locks the levers which were before free, the movement of the lever *F'* unlocking *F<sup>3</sup>*, the movement of the lever *F<sup>2</sup>* unlocking *F<sup>4</sup>*, and the movement of the lever *G'* unlocking *F<sup>5</sup>*.

I will now describe the manner of operating the levers *G'* and *F<sup>5</sup>* and plates *H<sup>3</sup>* and *K* when a train of cars has to be directed from the siding onto the main track, all the levers being in the position shown in Fig. 6 when the continuity of the main track is uninterrupted.

It should be explained here that where a switch occurs there are generally four signals, two to notify the engineer of a train approaching the switch in one direction, and two for warning the engineer of a train approaching the switch in the opposite direction. The signals near the switch on each side are termed the "home" signals, and the two situated farther off "distant" signals, these distant-signals notifying the engineer that he must stop at the home-signal if the latter is at "danger," and also giving him time to slow up the train before reaching the switch.

The first lever to be operated is the switch-lever *G'*, which is moved in the direction of its arrow, Fig. 6, to the position shown in Fig. 7, in doing which it locks the levers *F'* and *F<sup>2</sup>* connected to the home-signals on each side of the main track *W*, they in turn locking the levers appertaining to the distant-signals *F<sup>3</sup>* and *F<sup>4</sup>*. The lever *G'* when in the position shown in Fig. 7 releases the plate *K*, which permits the lever *F<sup>5</sup>*, connected to the signal on the siding *X*, to be operated to indicate that the switch is moved so that a train can pass from the siding onto the main track with safety. Thus it will be seen that when a train comes from the siding onto the main track all the signals appertaining to the main track are locked, and all indicate "danger," and cannot be released until the switch-lever *G'* is restored to its normal position.

The above description refers to my invention when used in connection with a switch. I will now describe the operation of the parts shown in the drawings when the signals have to be operated for a south-bound train to pass on the main track *W*. The first lever to be operated in this instance is the signal-lever *F'*, which is moved in the direction of its arrow, Fig. 6, to the position shown in Fig. 8, in doing which the beveled edge of the lever moves the plate *H<sup>2</sup>* in the direction of its arrow and unlocks the plate *H'*, thereby permitting the lever *F<sup>3</sup>*, connected to the distant signal, to be moved to the position shown in Fig. 8. It will be seen that both the home and distant signals appertaining to the south-bound train are operated to indicate that the track is clear, and that the south-bound train can pass with safety, while all the other signals indicate "danger," and are locked by the lever *F'*, and cannot be moved until this lever is restored to its normal position. I will now describe the operation of the signals for a north-bound train on the main track *W*. The first lever to be operated is the signal-lever *F<sup>2</sup>*, which is moved in the direction of its arrow, Fig. 6, to the position shown in Fig. 9, in doing which it moves the plate *H<sup>1</sup>* in the direction of its arrow and unlocks the plate *H<sup>3</sup>*, thereby permitting the lever *F<sup>4</sup>*, connected to the distant signal, to be moved to the position shown in Fig. 9, the two signals indicating that the track is clear, and that the north-bound train can pass with safety. The movement of the plate *H<sup>1</sup>* in the direction of its arrow locks all the other levers, through the medium of the projections *j* and collared rods *I*, the parts remaining thus locked until the lever *F<sup>2</sup>* is restored to its normal position, Fig. 6. The sliding plates and levers may be increased in number as circumstances may suggest—for instance, when there are two switches on each of two tracks and signals for each switch, or when a number of switches arranged at considerable distances apart have to be operated from one switch-house—and if desired, there may be two or more rows or series of



plates arranged above each other, as in the case of the plate K in Fig. 10.

It is not essential in carrying out my invention that both the levers and plates should be beveled. Each lever may be beveled and the corner of the plate in which it acts slightly rounded, as shown in Fig. 14, or the corner of the plate may be beveled and the edge of the lever slightly rounded, as in Fig. 15; but it is preferable for obvious reasons that both levers and plates should be beveled.

I claim as my invention—

1. The combination of a switch-lever, G', and a signal-lever, F', with a locking-plate, H', guided and free to slide laterally between said levers, the parts being beveled, as described, whereby each plate is caused to act directly upon and to be acted upon directly by both levers, all substantially as specified.

2. The combination of two adjacent plates, H' H<sup>2</sup>, adapted to and free to slide laterally in guides in a frame, with a lever hung so as to swing longitudinally between said plates, said parts being beveled, as described, where-

by the lever is caused to act directly upon and to be acted upon directly by both of the said plates, all substantially as specified.

3. The combination of a series of plates, H' H<sup>2</sup>, &c., adapted to guides in a frame with switch-levers and signal-levers for operating and being operated by the said plates, and with connections, substantially as described, whereby the movement of one plate is imparted to a distant plate, as specified.

4. The combination of a system of plates, H' H<sup>2</sup>, &c., adapted to guides in a frame, and switch-levers and signal-levers constructed to operate on and to be operated by the plates, with a supplementary plate or plates, K, situated above a plate or plates of the series marked H' H<sup>2</sup>, &c., substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ED. H. JOHNSTON.

Witnesses:

HARRY SMITH,  
HENRY HOWSON, Jr.