(No Model.) 2 Sheets—Sheet 1.

G. THEW.

ELECTRIC DEVICE FOR PREVENTING ACCIDENTS ON RAILWAYS.

No. 435,259. Patented Aug. 26, 1890.

Fig. 1.

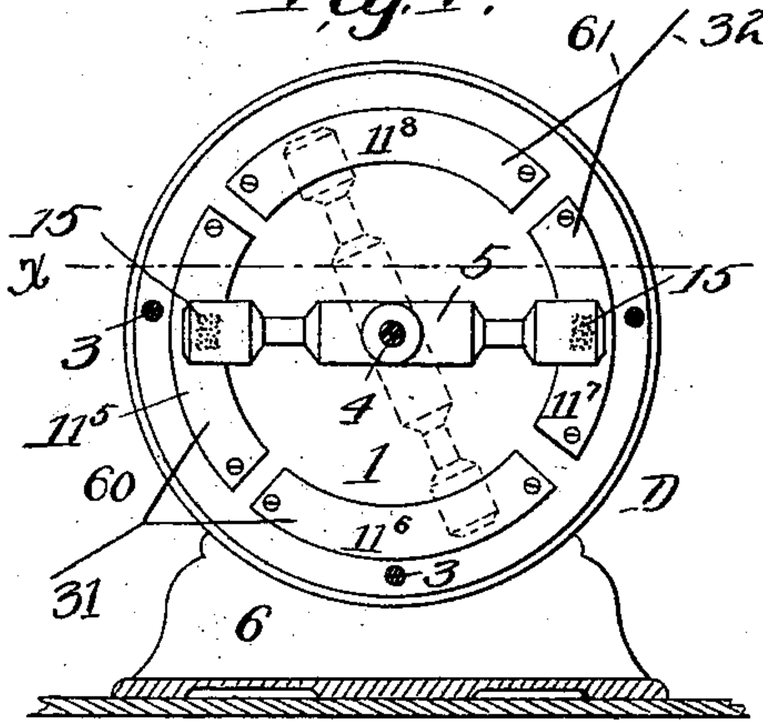


Fig. 2.

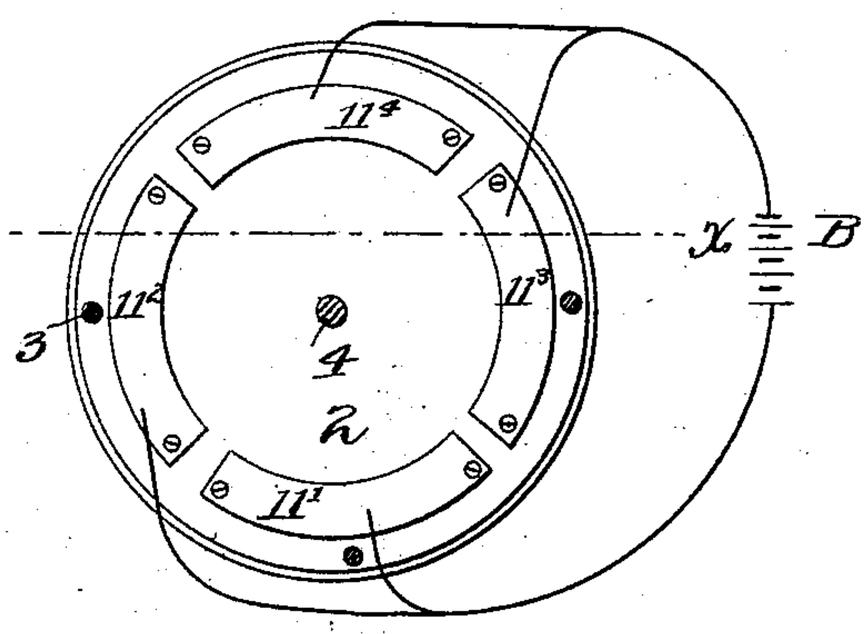


Fig. 3.

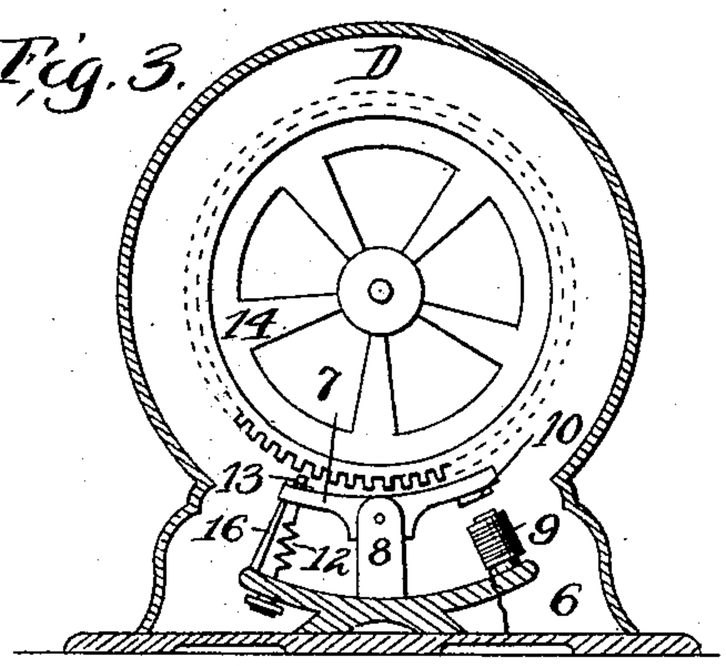


Fig. 4.

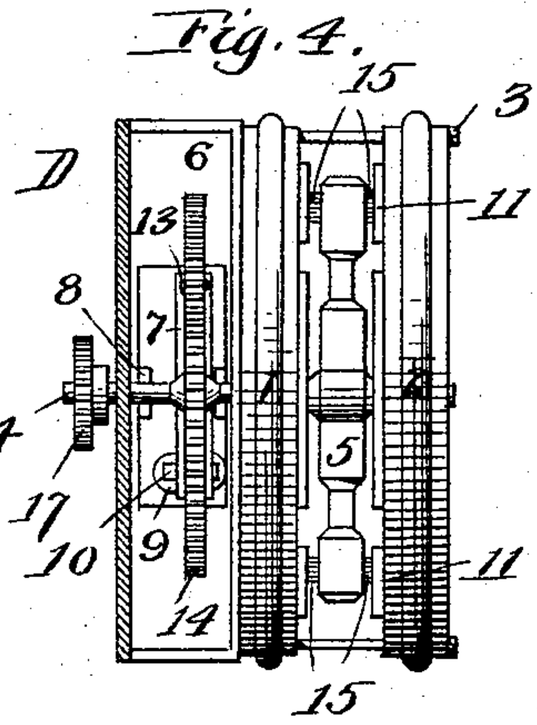


Fig. 5.

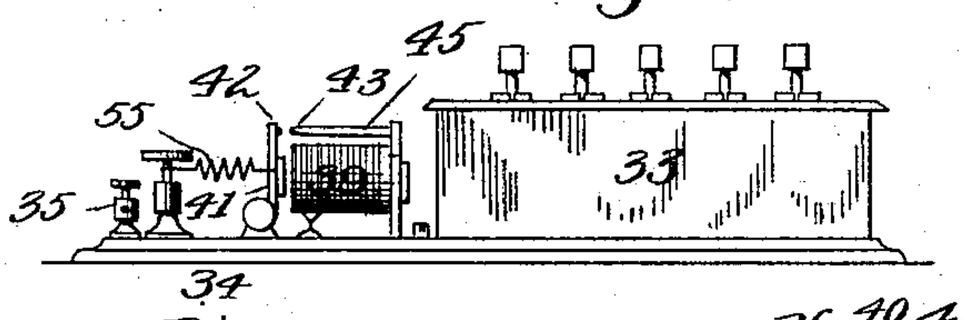


Fig. 7.

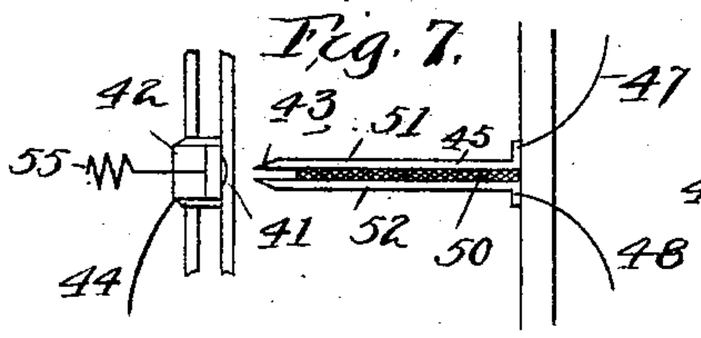
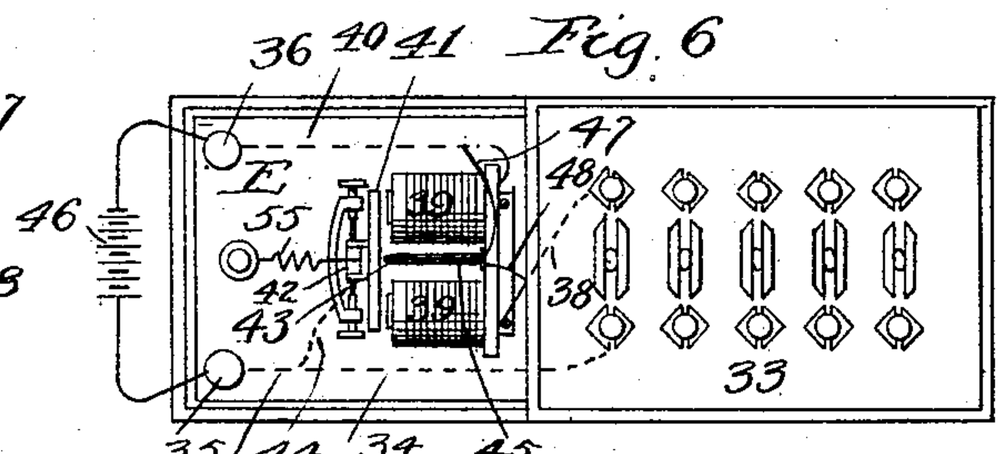


Fig. 6



37

Witnesses
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James McKeon

Inventor
Gilmore Thew.
by Ellis Spear Atty.

(No Model.) 2 Sheets—Sheet 2.

G. THEW.

ELECTRIC DEVICE FOR PREVENTING ACCIDENTS ON RAILWAYS.

No. 435,259. Patented Aug. 26, 1890.

Fig. 8.

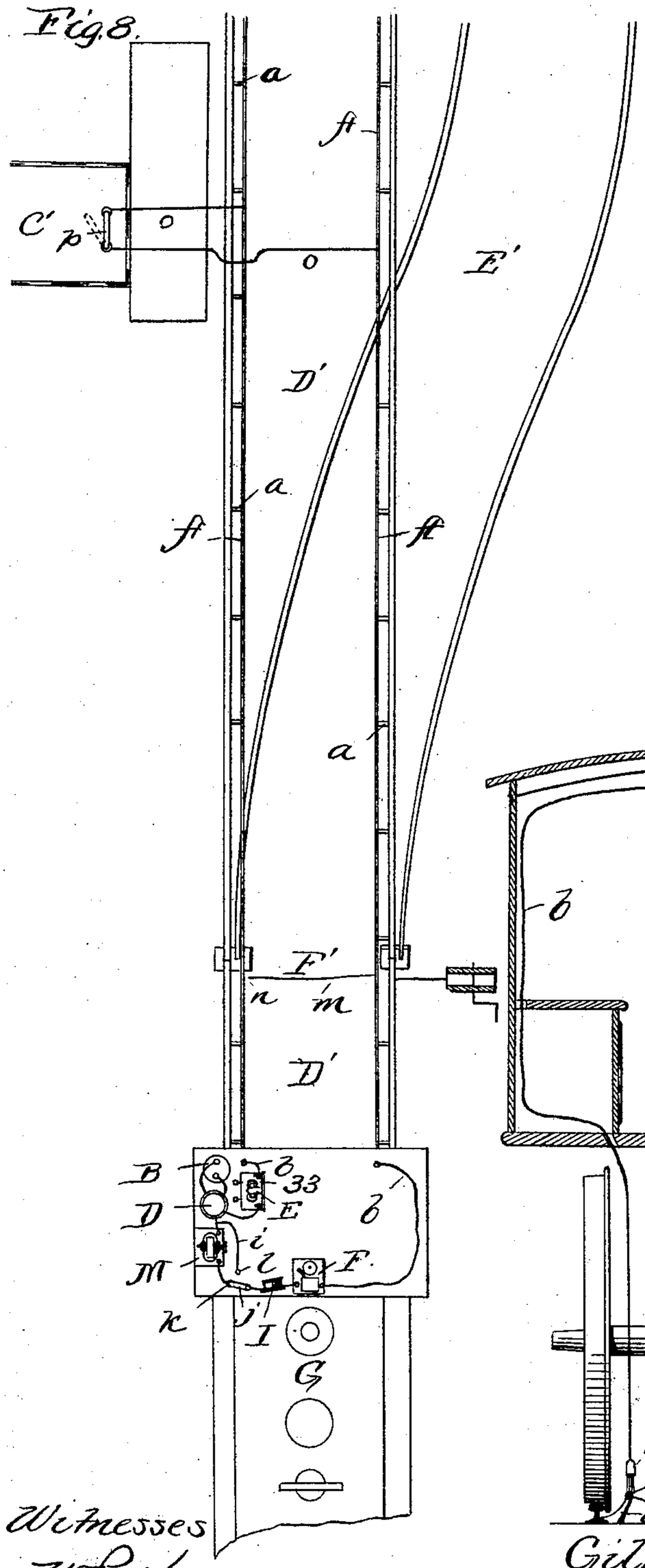
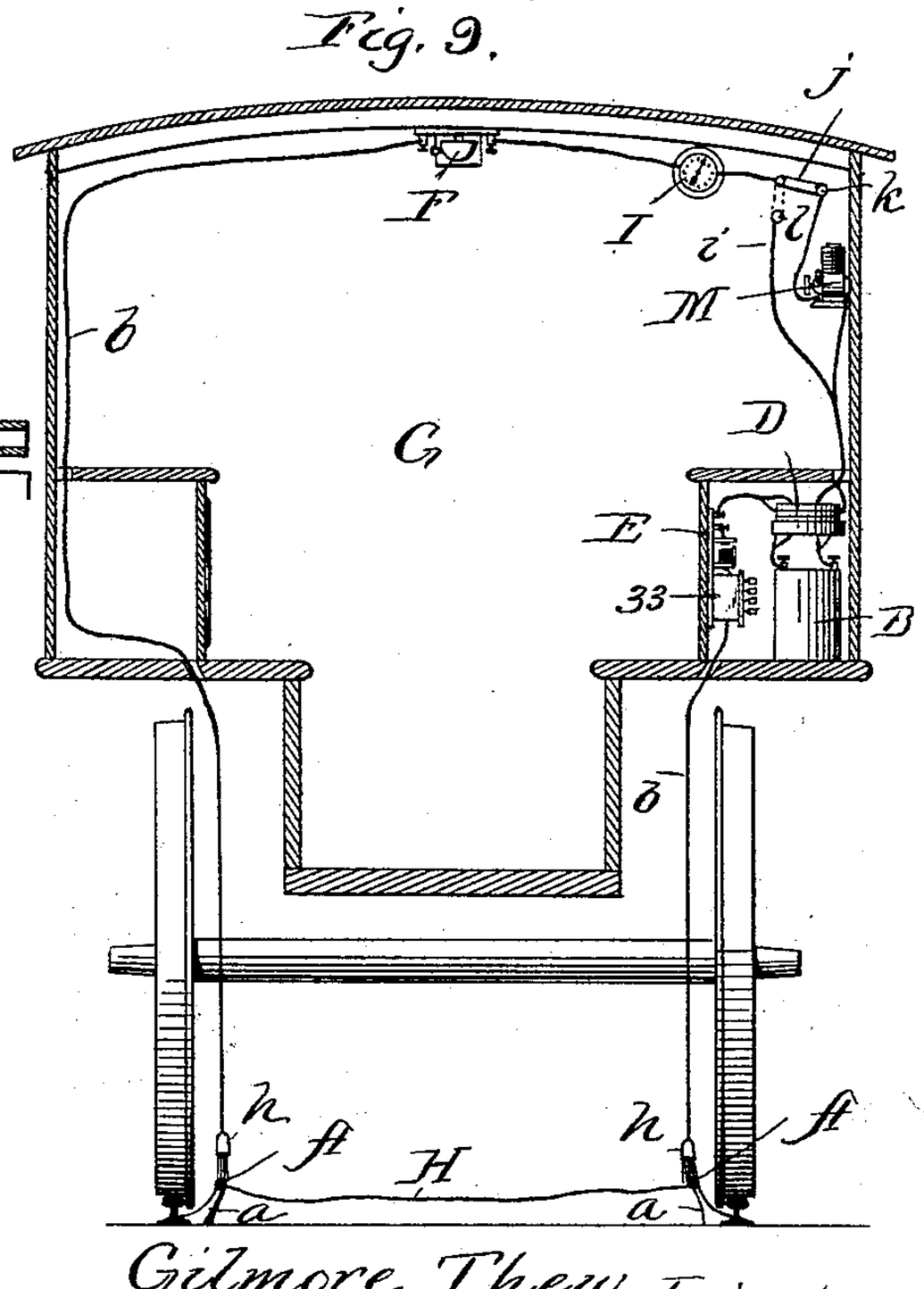


Fig. 9.



Witnesses
W. P. Keene.
James McKeen

Gilmore Thew, Inventor
by Ellis Spear Atty.

UNITED STATES PATENT OFFICE.

GILMORE THEW, OF PERU, NEW YORK.

ELECTRIC DEVICE FOR PREVENTING ACCIDENTS ON RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 435,259, dated August 26, 1890.

Application filed February 25, 1890. Serial No. 841,763. (No model.)

To all whom it may concern:

Be it known that I, GILMORE THEW, a citizen of the United States, residing in the town of Peru, county of Clinton, and State of New York, have invented a new and useful Improvement in Electric Devices for Preventing Accidents on Railways, of which the following is a specification.

The following is a detailed description of my invention, reference being had to the accompanying drawings, forming part thereof.

Similar letters and numerals refer to similar parts in said drawings.

To carry my invention into effect I have invented the electric apparatus illustrated in the accompanying drawings, in which—

Figures 1, 2, and 3 represent views of different parts of a pole-changing device D with an automatic electric stop-motion, said stop-motion illustrated in Fig. 3. Fig. 4 illustrates the combination of said Figs. 1, 2, and 3 on a line *x x*, Figs. 1 and 2, when placed in position for operation. Figs. 5 and 6 represent different views of a combined rheostat and automatic electric cut-out; Fig. 5, a side view, and Fig. 6 a top view. Fig. 7 illustrates a top view of a portion of said cut-out. Fig. 8 is a plan view of a section of track. Fig. 9 is a vertical section through a locomotive-cab, showing the devices in position.

In Figs. 1, 2, and 4 the numerals 1 and 2 represent two non-conducting disks held in position at a proper distance from each other by bolts or rods 3 for the purpose herein described, said disks to have permanently fastened to their inner surface a series of metallic plates 11, placed in a circle at a proper distance from each other and at a proper distance from the center of said disks for the purpose herein described, the said disks 1 and 2 to have a perforation at their centers for the insertion of a shaft 4, said shaft to have firmly fastened thereto an arm 5 to revolve at right angles with it between said disks 1 and 2, said arm 5 to have fastened at or near its ends a metallic brush or lip 15 said brush or lip to be placed at a proper distance from the center of said arm so as to come in contact and make proper electric connection with the aforesaid series of plates 11.

Now to illustrate the operation of this pole-changing device D, we will connect the positive pole of the battery B to plates $11'$ and 11^2, the negative pole to plates 11^3 and 11^4 in Fig. 2; also we will connect plates 11^5 and 11^6 to point 31 by conductor 60, and plates 11^7 and 11^8 to point 32 by conductor 61 in Fig. 1. Now if by any means plates 11^3 and 11^5 were connected and plates 11^2 and 11^7 were at the same time connected, the positive pole of said battery would be presented to point 32 and the negative pole to point 31, and by disconnecting plates 11^3 and 11^5, and at the same time disconnecting plates 11^2 and 11^7 and connect plates $11'$ and 11^6, and at the same time connecting plates 11^4 and 11^8 it would reverse the current and the positive pole would be presented to point 31 and the negative pole to point 32. Now it is evident by the above description that by revolving said shaft 4, causing arm 5 to revolve between the aforesaid disks 1 and 2, it would connect the series of plates 11, as above stated, causing an electric current to flow (if said points 31 and 32 were connected) alternately, first, for illustration, from point 32 to point 31 and then from point 31 to point 32 at each revolution of said shaft 4, as described, and for the purpose herein set forth. Said shaft 4 to have firmly fastened thereto a gear-wheel 14, and a gear-wheel or pulley 17, for the purpose next described. Gear-wheel or pulley 17 is for the purpose of engaging with a motive power suitable to convey a rotary motion to said shaft 4. Gear-wheel 14 is for the purpose of engaging with the automatic electric stop-motion next described, and is illustrated in Fig. 3.

In Figs. 3 and 4, 9 represents a pair of electro-magnets, 10 represents their armature, and 7 the armature-lever, with its fulcrum at 8, said lever held against point 16 by means of spring 12. Now if a current of electricity of sufficient strength pass through said magnets 9, it would cause armature 10 to be attracted toward said magnets, causing said armature-lever 7 to turn on its fulcrum at 8 by overcoming the resistance of the spring 12, thus causing the point 13 to engage with the cogs on gear-wheel 14, thereby stopping the rotary motion of said wheel 14, said shaft 4, and arm 5, and when the current ceased to flow with sufficient strength for the purpose

above described said spring 12 would draw said lever 7 against point 16, thereby disengaging point 13 from the cogs on said gear-wheel 14, thus allowing shaft 4 to be revolved again, thus setting said pole-changing device in operation. Now it is evident by the above if we were to connect one of the electric conductors 60 or 61, leading from one pair of the series of plates 11 on disk 1 to the electro-magnets 9, when a current of electricity of sufficient strength was made to flow through said pole-changing device it would cause the armature 10 to be attracted toward magnets 9, thereby causing point 13 to engage with the cogs of said gear-wheel 14, thereby causing the rotary motion of shaft 4 and arm 5 to stop, for the purpose herein described. Now if we connect the poles of an electric battery or dynamo to said pole-changing device, as above described, and convey a rotary motion to said shaft 4, causing said arm 5 to revolve between disks 1 and 2, it would cause the current from said battery or dynamo to be reversed at each revolution of said shaft 4—that is, it would flow first in one direction, then in the other, on such conductors as should connect points 31 and 32, and when the current became of sufficient strength to cause the automatic electric stop-motion to operate it would cause the said pole-changing device to cease reversing the current, all for the purpose herein described.

In Figs. 5 and 6, 33 represents a rheostat, and E represents an automatic electric cut-out, said cut-out so constructed that by connecting the poles of a battery or dynamo to the binding-posts 35 and 36—for illustration, connect the positive pole of the battery 46 to binding-post 35 and the negative pole of said battery to binding-post 36. Now a current of electricity would flow from said battery to binding-post 35 on conductor 37 to rheostat 33, from said rheostat on conductor 38, through magnets 39 on conductor 40, to binding-post 36, and thence back to battery 46. Now if the current were of sufficient strength to cause said magnets 39 to attract their armature 41, overcoming the resistance of spring 55, causing armature-lever 42 to come in contact with point 43, it would cut out of the electric circuit said rheostat 33 and magnets 39, causing the electric current to flow from said battery 46 to binding-post 35 on conductor 37, from conductor 37 on conductor 44 to armature-lever 42, from armature-lever 42 by contact-point 43 on conductor 45, thence on conductor 47 to conductor 40, on conductor 40 to binding-post 36, thence back to the battery 46; but if the magnets 39 were cut out of the electric circuit they would cease to attract their armature 41 and the desired result, which is the cutting out of the electric circuit of the said rheostat 33, causing a more powerful current to flow from battery 46 to binding-post 35, from binding-post 35 on the aforesaid conductors 37 and 44, armature-lever 42, conductors 45, 47, and 40, from binding-post 36 on conductor leading to said battery 46, would not be obtained; but to avoid this difficulty I use the fixture illustrated in Fig. 7, in which 45 represents the electric conductor 45, before referred to in Figs. 5 and 6, which is composed of three strips of material, one of them a non-conductor, the others conductors of electricity so placed in connection with each other that the strip 50, which is the non-conductor, is placed between the strips 51 and 52, which are the conductors, so as to insulate them from each other, said strips 51 and 52 to be longer than the strip 50, so as to project beyond the said insulator-strip 50, and form the points 43. Now by connecting an electric conductor 48 to one of the conducting-strips 51 and 52 and connecting said conductor 48 with the aforesaid conductor 38 when the armature-lever 42 comes in contact with points 43, there would be a current of electricity flowing on armature-lever 42 from points 43 on said conductor 45, a portion on conductor 52 to conductor 48, from conductor 48 on conductor 38 through the aforesaid magnets 39 to conductor 40, and a portion on conductor 51, from conductor 51 on conductor 47 to conductor 40, and both of the aforesaid portions on conductor 40, from conductor 40 to binding-post 36, from thence on the conductor leading to the battery, thereby keeping in circuit the magnets 39, causing said armature 41 to be attracted thereto, keeping armature-lever 42 in contact with point 43, all for the purpose of cutting out of the electric circuit said rheostat 33, causing a more powerful current to flow on the aforesaid conductors, for the purpose herein described. My reason for dividing the current and causing a portion to flow through said magnets 39 and a portion on conductor 47 is, that if a current of electricity of great intensity were furnished to said cut-out and rheostat, and said cut-out were set by means of spring 55 to operate when a desired degree of electric energy was obtained, it would, when said cut-out 34 operated, be of such strength as to burn out said magnets 39; but by dividing the current and having only a portion of it flow through magnets 39 it would avoid this difficulty.

Now it is evident by the foregoing description that if the poles of an electric generator were connected to said binding-posts 35 and 36, and said generator were capable of furnishing a current of great power, and the said cut-out were set to operate when a desired degree of electric energy was obtained, when such degree was obtained said cut-out would operate to cut out of the electric circuit said rheostat, thereby causing a current of greater power to flow through said cut-out and on such conductors as were used to connect said generator to said cut-out and rheostat, substantially as set forth, and for the purpose herein described.

In Figs. 8 and 9 A A represent two electric

conductors placed on or near the track and held in position by any suitable insulator, which insulator is represented at *a a*. *b* represents an electric conductor placed in a locomotive-cab and provided with metallic brushes or other device *h* at each end for making proper electric connection with the aforesaid conductors A A, said conductor *b* to have in its circuit an electric bell F, an electric-measurement instrument I, to indicate the passage of all electric currents on the said conductor *b*, an electric motor M for developing such power as is necessary for the desired purpose, a pole-changing device D, (illustrated in Fig. 4 and hereinbefore described,) an electric battery or dynamo B, a rheostat 33, and an automatic electric cut-out E, hereinbefore described, and illustrated in Figs. 5 and 6. *i* represents an electric conductor so placed in connection with said conductor *b* that by turning switch-lever *j* from point *k* to point *l* it would cut out of the electric circuit said electric motor M, for the purpose hereinafter described.

Now, in Fig. 9, to illustrate the manner in which the aforesaid electric apparatus would operate, I will connect the conductors A A by an electric conductor H. By the above description it is evident that a current of electricity would flow from said battery B on electric conductor *b* through the aforesaid electric apparatus, bell F, measurement instrument I, electric motor M, pole-changing device D, rheostat 33, and cut-out E, from contact-points *h h* on conductors A A, from conductors A A on conductor H, and if the current were of sufficient strength to cause the automatic electric cut-out to operate to cut out of the circuit the said rheostat it would cause a more powerful current to flow, causing the automatic electric stop-motion in pole-changing device to stop said pole-changing device from reversing the current. Then a straight and powerful current would flow on said conductors and through the aforesaid electric apparatus, causing motor M to operate, and, by having the electric generator of sufficient capacity the said motor M would develop such power as would be necessary to apply the brakes and close the throttle.

In Fig. 8 C′ represents a station; D′, a section of the main track; E′, a section of a side track with its terminus at F′. G represents a locomotive standing on the main track. *m* represents an electric conductor so placed across the track that by opening the switch at F it would draw said conductors A A in contact therewith. It is evident by the above description that if said switch at F′ were thrown open it would connect electrically the said conductors A A, and it would be impossible for engine G to run onto side track E′; but by using said conductor *i*, in connection with conductor *b*, and cutting out of the electric circuit (which circuit is from battery B on conductor *b*, from contact-points *h h* on conductors A A, and from conductors A A to contact-point *n* on conductor *m*) said motor M, it would enable the engineer to move his train onto side track E′ and at the same time keep the remainder of the electric apparatus in circuit, that if another train that is provided with the hereinbefore-described electric apparatus were approaching the depot it would cause the electric apparatus on the approaching train to operate to signal its engineer and close the throttle and apply the brakes. O represents an electric conductor so placed in connection with the aforesaid conductors A A and leading to the station C′, and being provided with an electric switch or button at *p*, that by connecting the said conductors A A, by means of said switch or button *p* on conductor O, it would complete the electric circuit in case a train were approaching the depot, said train being supplied with the before-described electric apparatus, causing an electric current to flow from generator *f*, through electric apparatus on conductor *b* on the approaching locomotive, from contact-points *h h* on conductors A A, from conductors A A on conducter O, thereby enabling a station agent to cause the aforesaid electric apparatus on the approaching train to operate, as hereinbefore described, to apply the brakes and close the throttle. Now it is evident by the foregoing description that if by any means whatever the aforesaid electric conductors A A should be connected electrically and all trains were provided with the hereinbefore-described electric apparatus, (which is an electric generator, a pole-changing device with an automatic electric stop-motion, a rheostat and automatic electric cut-out, an electric motor, an electric-measurement instrument, and an electric bell,) when any train approached within a desired proximity of the point at which the aforesaid conductors A A were connected, it would cause the said electric apparatus to operate, as hereinbefore described, by there being a current of electricity flowing from said generator through the said apparatus on the aforesaid conductors to signal the engineer and stop the train.

My reason for using a pole-changing device is, for illustration, if one train going north presented the positive pole of its battery or dynamo to the east conductor on or near the track by one of the contact-points *h h*, and the negative pole to the west conductor by the other contact-point *h*, any train going south would present the negative pole of its battery or dynamo to the east conductor, and its positive pole to the west conductor. Consequently a current of electricity would flow without neutralization on the aforesaid conductors, from generator *f*, on conductor *b*, through such electric apparatus as is connected therewith, from contact-points *h h* on conductors A A; but in case two or more trains were going north or in the same direction, they would each present like poles of their electric generator to the same conductor on or near the track,

thereby neutralizing their electric energy, and therefore no effect would be produced; but in using a pole-changing device on each train and connecting thereto any power suitable to keep a steady and regular motion, and running each of said devices at a different rate of speed relative to each other, when any two or more trains were running, either in the same or in opposite direction, there would shortly be a straight current of electricity flowing on the herein said conductors, which conductors are A A, on or near the track, and *b* on the locomotives without being neutralized. Now it is evident, by referring to the description of the pole-changing device illustrated in Figs. 1, 2, 3, and 4 that a portion of the time the electricity would be neutralized and the remainder of the time the electric energy would flow without neutralizing. Therefore it is evident by these descriptions that by means of the rheostat being set to maintain any desired degree of energy on the aforesaid conductors A A on or near the track and *b* in locomotives, when any train that is provided with the hereinbefore-mentioned electric apparatus comes within a desired proximity of a point at which the aforesaid conductors A A were connected electrically by any means whatever, it would cause the automatic electric cut-out to operate, as hereinbefore described, to cut out of the electric circuit the said rheostat, thereby causing a powerful current of electricity to flow on the aforesaid conductor *b*, through the aforesaid electric apparatus in locomotives, from contact-points *h h* on conductors A A, and on such conductors as should connect said conductors A A, thereby causing the automatic electric stop-motion in the pole-changing device to operate, as hereinbefore described, to stop the pole-changing device from reversing the current while the current was of sufficient strength; but when the current ceases to be of sufficient strength to cause the said automatic electric stop-motion to operate to stop the pole-changing device from reversing the current, said pole-changing device would again operate in reversing the current.

It is evident by the above description that if a train that is provided with the aforesaid electric apparatus should come within a desired proximity of a point at which the said conductors A A were connected, it would cause the aforesaid electric apparatus to operate to stop said train; but if the engineer desired he could by means of the switch-lever *j*, brought in contact with point *l*, cut out of the electric circuit said motor M, (all illustrated in Figs. 8 and 9,) thereby enabling him to proceed with caution and discover the cause of said conductors A A being connected, or enable him to back his train if he desires.

My reason for using a rheostat is, that if a current of electricity of sufficient strength to cause said motor M to operate to develop the requisite amount of power to apply the brakes and close the throttle were maintained at all times on the aforesaid conductors A A, the electric energy would be so great that it would extend at too great a distance from the battery or dynamo B on said conductors A A, that if by any means said conductors A A were connected electrically at a distance that there would be no cause for alarm. It would cause the electric apparatus in locomotive to operate before the train came within dangerous proximity of the point at which said conductors A A were connected; but in using a rheostat and setting the same properly it would maintain such a degree of electric energy on said conductors A A as would be necessary that when a train that was provided with the hereinbefore said electric apparatus comes within the desired proximity of the point at which said conductors A A were connected electrically to cause a current of electricity of sufficient streng'h to flow through the automatic electric cut-out, to cause said cut-out to cut out of the electric circuit said rheostat, causing a more powerful current of electricity to flow on the aforesaid electric conductors and through the aforesaid electric apparatus, causing the automatic electric stop-motion in the aforesaid pole-changing device to stop said pole-changing device from reversing the current. Consequently there would be a straight and powerful current flowing on the aforesaid conductors and through the aforesaid electric apparatus, causing said motor M to operate to apply the brakes and close the throttle, and thus stop the train.

My reason for using a measurement instrument is that if two or more trains were traveling in the same direction the engineers could, by referring thereto, detect the passage of an electric current on conductors A A on or near the track from contact-points *h* on conductors *b* in the locomotives, thereby enabling them to detect the relative distance at which their trains were traveling. If the current was strong, they would know thereby that they were near each other; but if there was little or no electric energy flowing through said measurement instrument they would know that they were far enough apart and out of danger of collision, thus giving them the privilege to govern the speed of their trains accordingly. The engineers could also detect the passage of an electric current on the aforesaid conductors, however weak, from any cause whatever.

My reason for using an electric bell is, by having its magnets of proper resistance, it would give signal when the automatic electric cut-out operates to cut out of the circuit the rheostat. Thus the bell would signal the engineer at the time that the electric apparatus operated to apply the brakes and close the throttle, thus giving him notice of the time at which his train was being stopped.

This invention may be applied in numerous ways for the prevention of accidents and the convenience of the railway companies and the safety of the traveling public.

It is evident by the foregoing descriptions that if the railways were provided with two electric conductors placed along the lines on or near the track, and all locomotives should be provided with the aforesaid electric apparatus on an electric conductor which has a contact-point at each end, each of said contact-points to come in contact with one of the conductors on or near the track, when any train came within a desired proximity, which may be governed by means of the rheostat being set to maintain the proper amount of electric energy, of a point at which the said conductors on or near the track were connected electrically, it would cause the said electric apparatus in the locomotive to operate, as hereinbefore described, to stop said train.

The conductors on or near the track may be connected in numerous ways for the desired purpose. All railway-switches may be provided with an electric conductor, as described hereinbefore, and illustrated in Fig. 8, so that if by carelessness or accident the switch should be thrown open the conductors on or near the track would be connected. Then if a train were approaching the switch when said train came within dangerous proximity of said open switch it would cause the electric apparatus in the approaching locomotive to operate to signal the engineer and stop the train, thus preventing accidents by open switches. Again, all stations may be provided with an electric conductor like conductor O, hereinbefore described, and illustrated in Fig. 8, enabling officials at the depots to stop any train coming into their depot, if desired. Again, any or all cars may be provided with an electric conductor similar to conductor *b* in the locomotives, said conductor illustrated in Fig. 9, only with the difference that it should not be provided with any electric apparatus except a switch or button, that by means of said switch or button the electric conductors A A could be connected or disconnected at any point on the railways at which said cars were.

It is evident by the foregoing descriptions that any official on a train in which the cars were provided with said conductor by means of the said switch or button could connect said conductors on or near the track, and in so doing would cause the electric apparatus in the locomotive of said train to operate, as hereinbefore described, to stop the train.

All bridges may be provided at each end with an electric conductor so placed at a proper distance from the conductors on or near the track that if a bridge be torn away it would draw the said conductors on or near the track in connection therewith, thereby connecting the said conductors on or near the track. Then if a train approached within dangerous proximity of said bridge it would cause the electric apparatus in the locomotive to operate, as hereinbefore described, to stop the train, thereby preventing accidents by broken bridges.

I am aware that combinations of electric apparatus for prevention of accidents on railways have been invented in this and in other countries, but I am not aware of their being used to any great extent; but I do not believe there has ever been invented in this or in any other country a combination similar to mine.

What I claim as my invention, and wish to secure by Letters Patent, is—

The combination of two conductors A A, insulators *a a*, conductor *b*, with contact-points *h h*, said conductor *b* provided with an electric generator B, the pole-changing device D, the rheostat 33, and automatic electric cut-out E, an electric motor M, an electric-measurement instrument I, an electric bell F, as and for the purpose hereinbefore described, the electric conductor *i*, provided with the contact-point *l*, switch-lever *j*, contact-point *k*, in connection with conductor *b*, substantially as herein described.

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

GILMORE THEW.

Witnesses:
N. CALLANAN,
E. K. ROMEYR.