No. 742,535. PATENTED OCT. 27, 1903.

E. WATSON.

LOCOMOTIVE ENGINEER'S ALARM.

APPLICATION FILED APR. 14, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

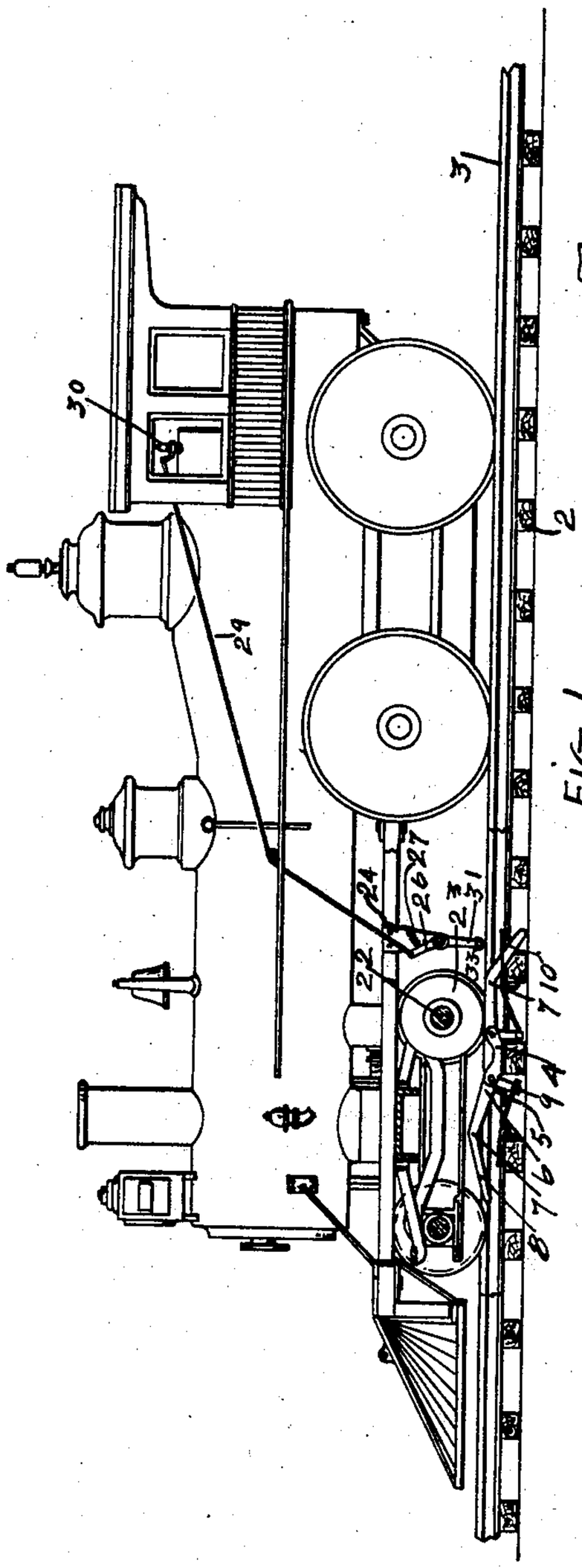

FIG. 1

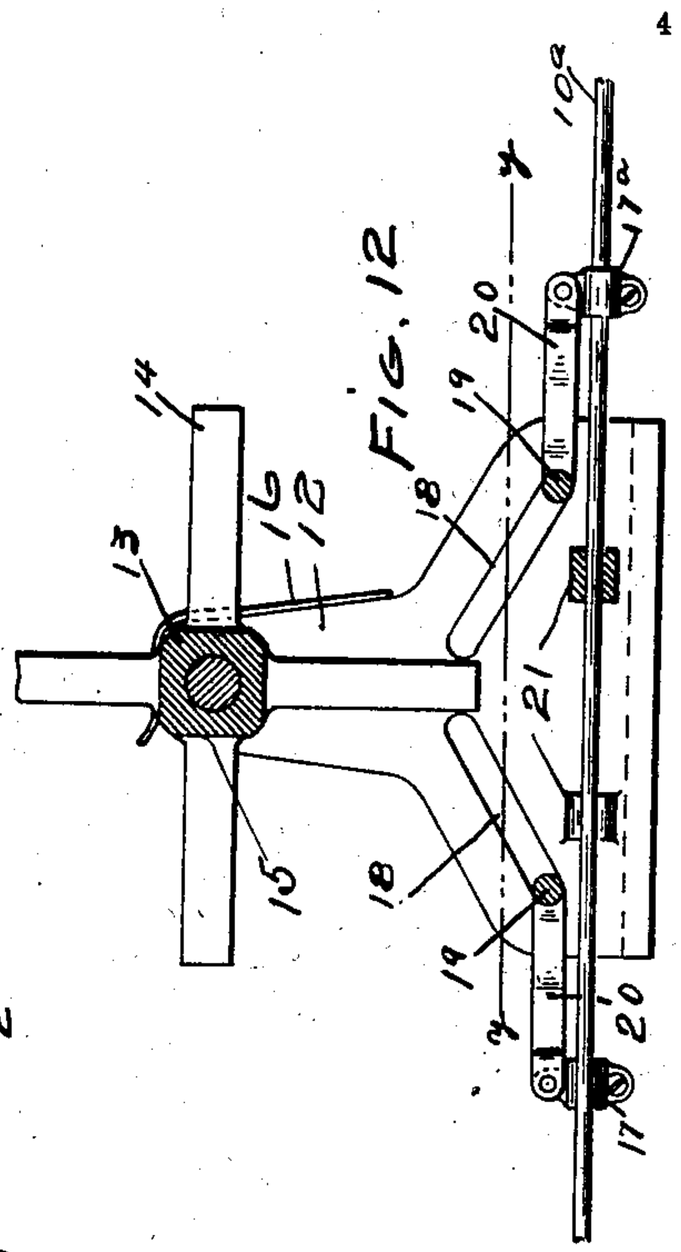

FIG. 12

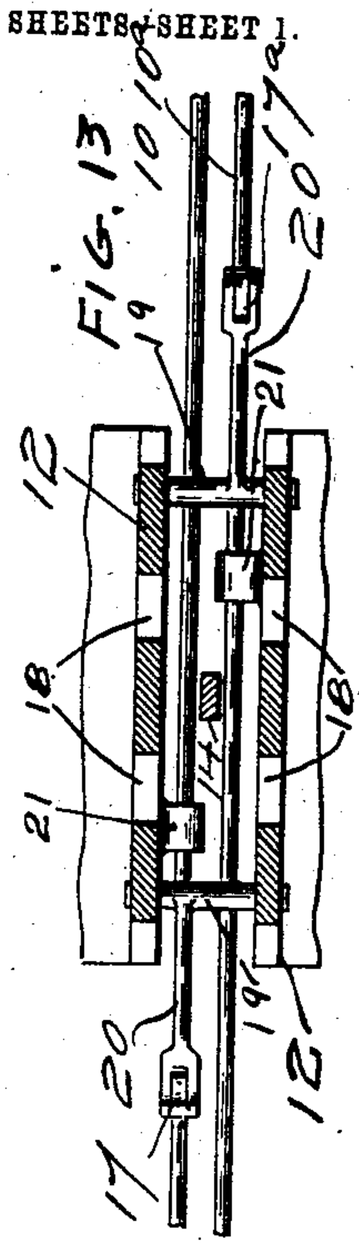

FIG. 13

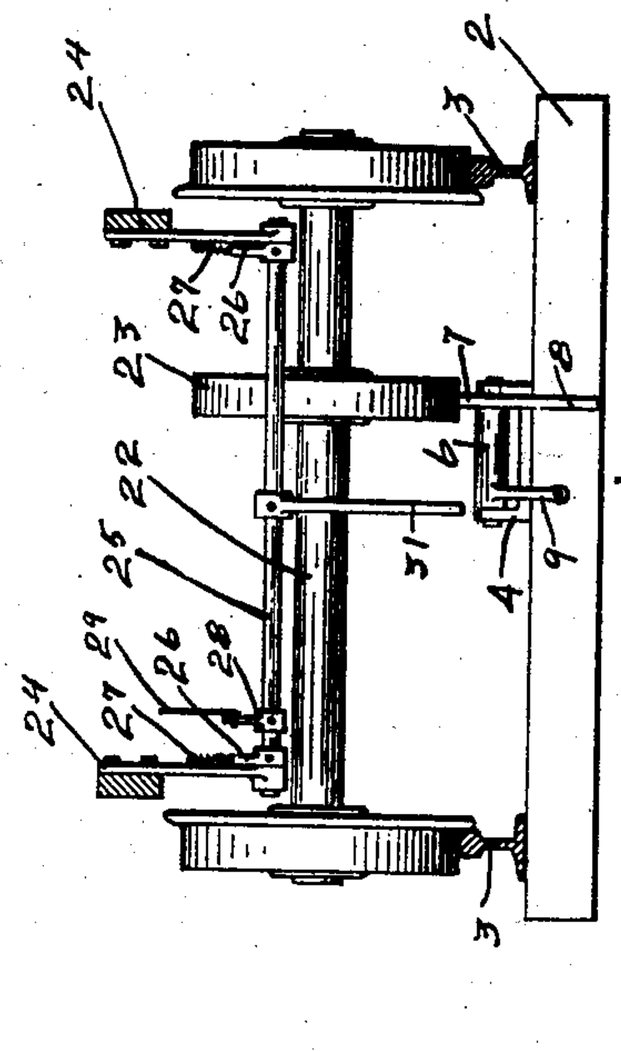

FIG. 7

Witnesses
C. F. Hanson.

INVENTOR
Ernest Watson
By Paul & Paul
his attorneys

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NO MODEL. 4 SHEETS—SHEET 2.

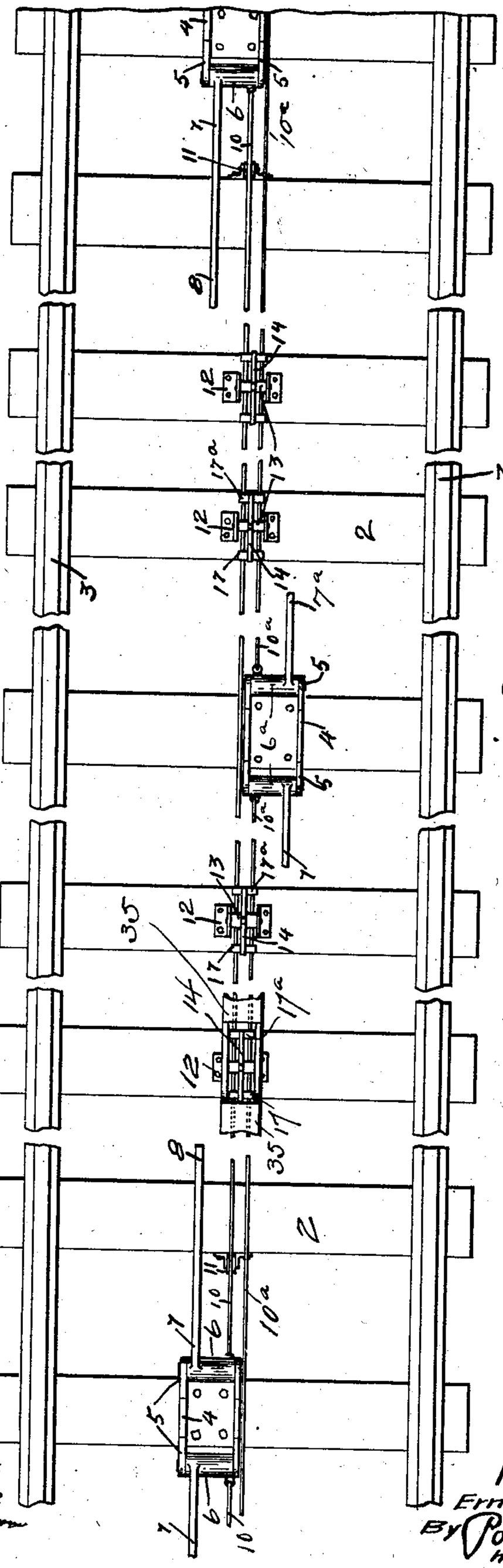

FIG. 2

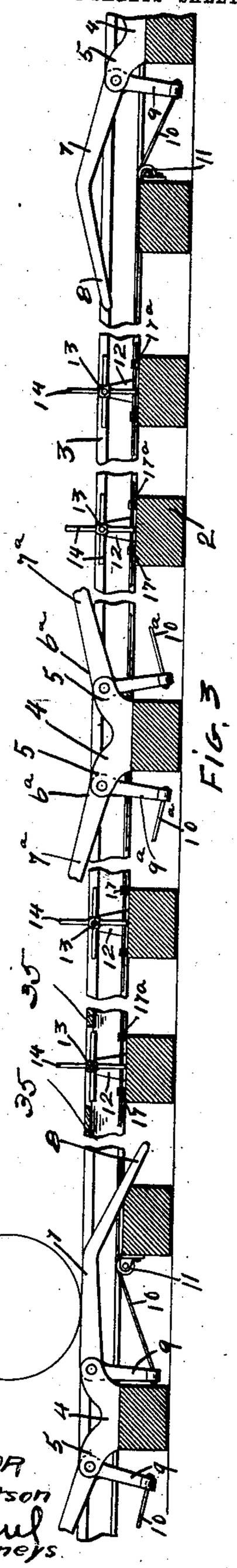

FIG. 3

Witnesses
E. F. Hayward
C. G. Hanson

INVENTOR
Ernest Watson
By Paul & Paul
his attorneys

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E. WATSON.

LOCOMOTIVE ENGINEER'S ALARM.

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NO MODEL. 4 SHEETS—SHEET 3.

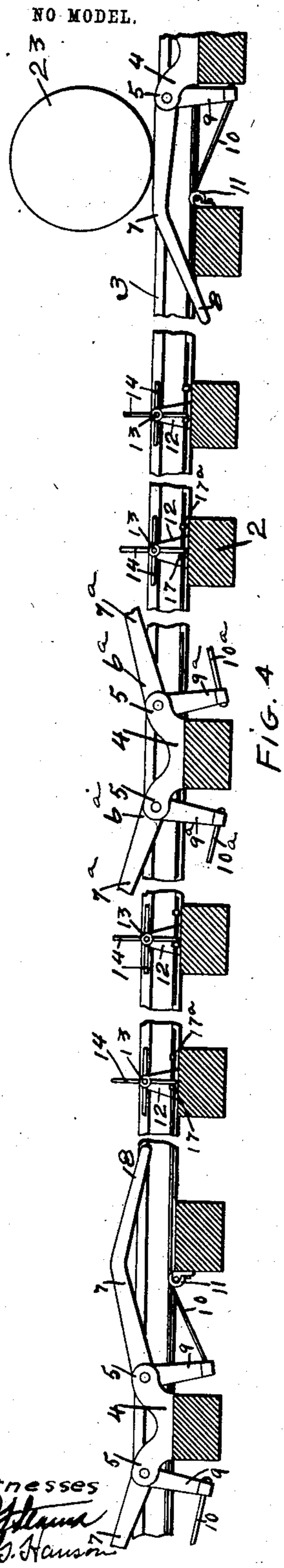


FIG. 4

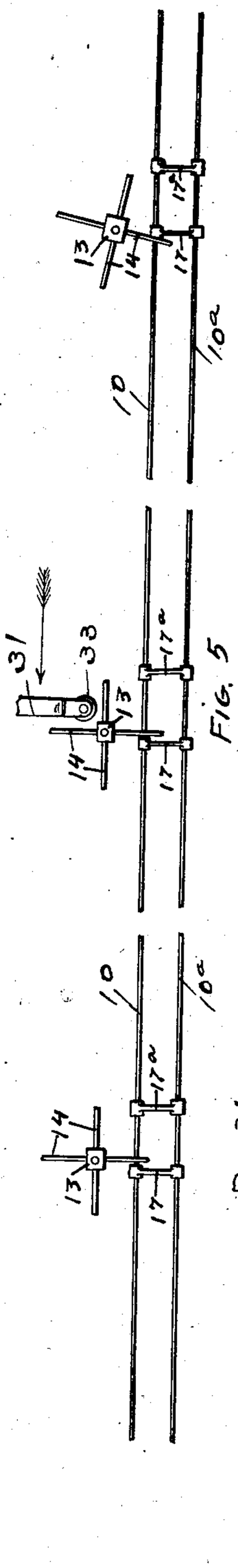


FIG. 5

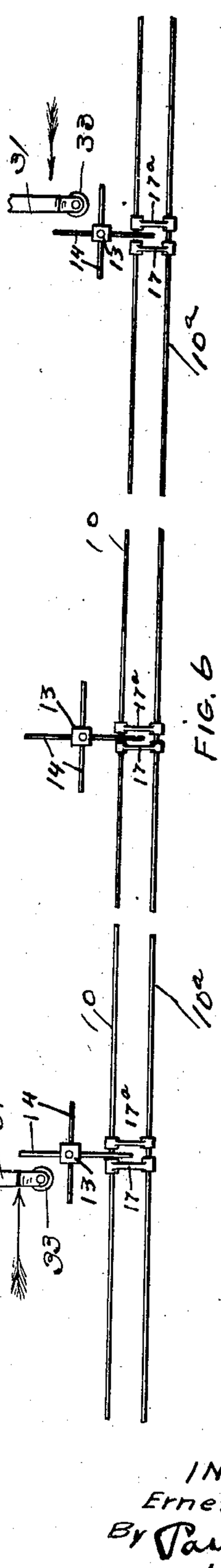


FIG. 6

Witnesses
C. F. Gleason
C. G. Hanson

INVENTOR
Ernest Watson
By Paul & Paul
his attorneys

No. 742,535. PATENTED OCT. 27, 1903.

E. WATSON.

LOCOMOTIVE ENGINEER'S ALARM.

APPLICATION FILED APR. 14, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

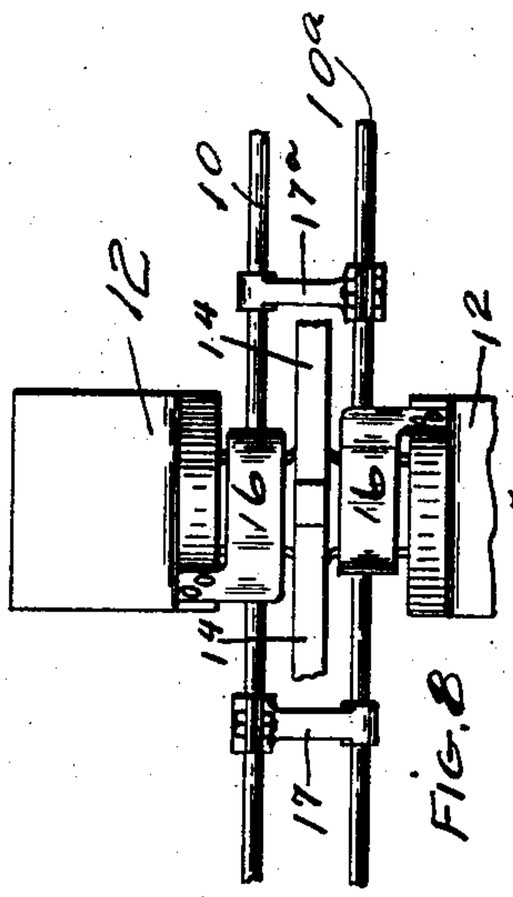
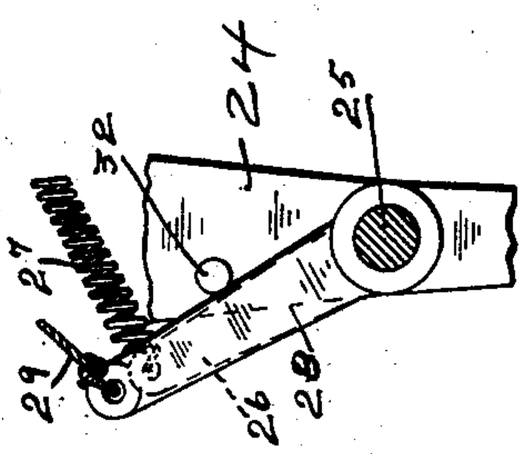


Fig. 8



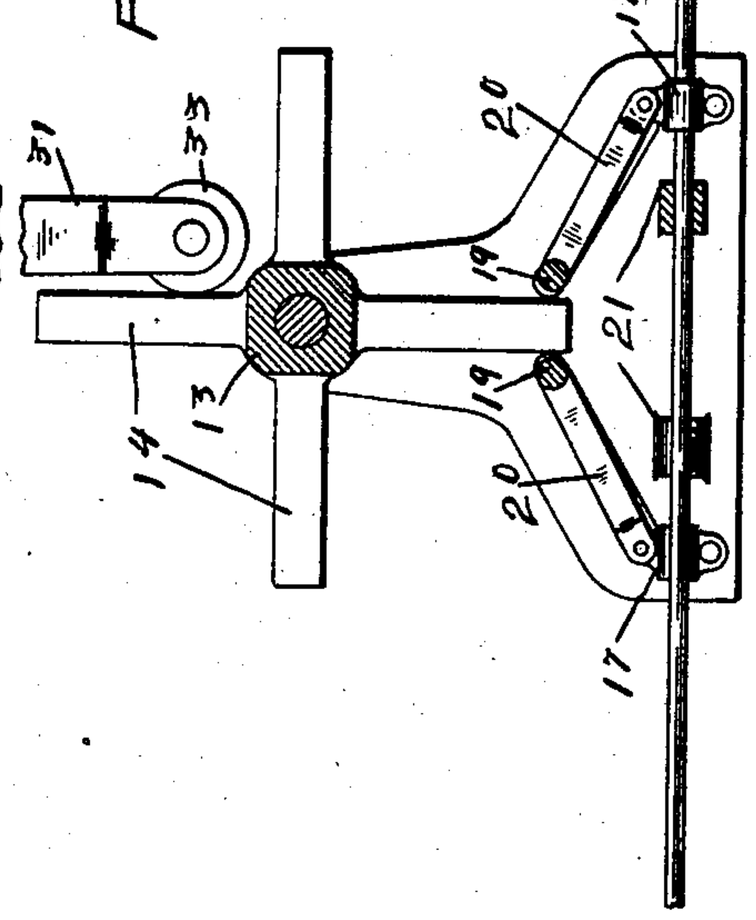


Fig. 11

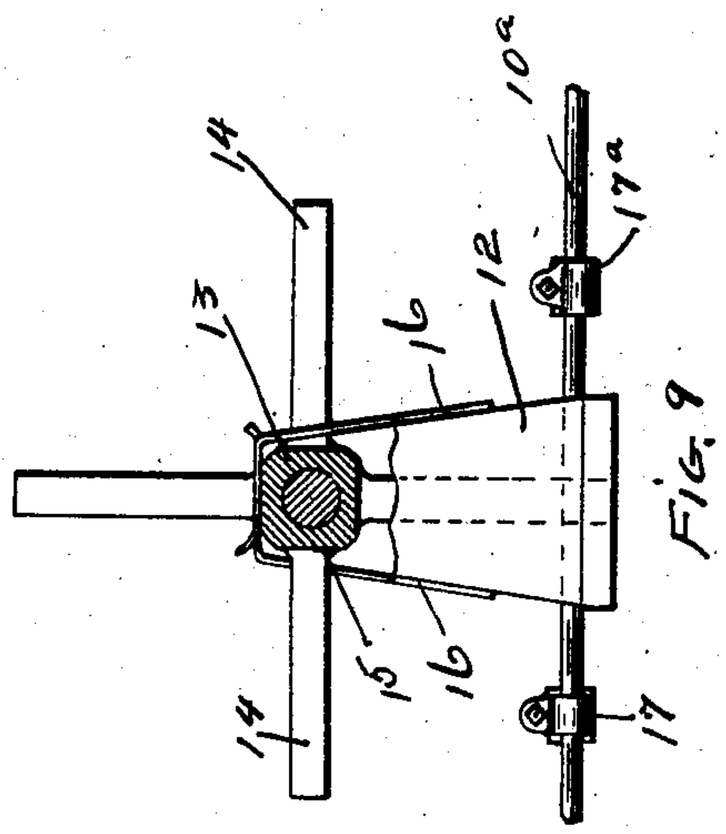


Fig. 9

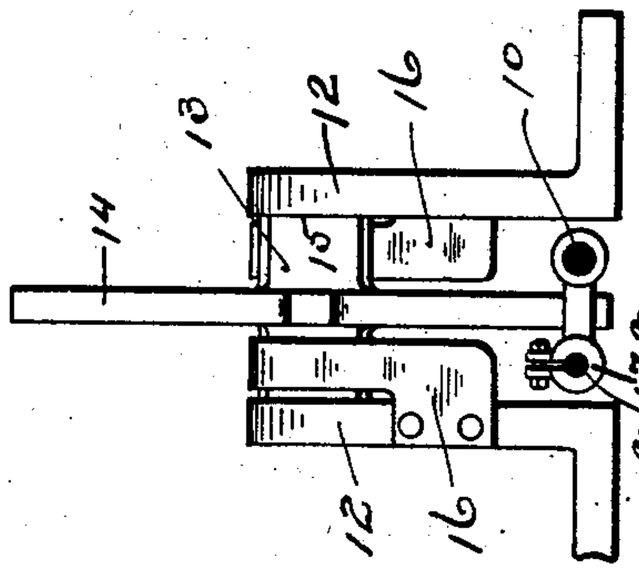


Fig. 10

Witnesses
E. Steinle
C. G. Hanson.

INVENTOR
Ernest Watson
By Paul & Paul
his attorneys

No. 742,535. Patented October 27, 1903.

UNITED STATES PATENT OFFICE.

ERNEST WATSON, OF BRAINERD, MINNESOTA.

LOCOMOTIVE ENGINEER'S ALARM.

SPECIFICATION forming part of Letters Patent No. 742,535, dated October 27, 1903.

Application filed April 14, 1903. Serial No. 152,558. (No model.)

To all whom it may concern:

Be it known that I, ERNEST WATSON, of Brainerd, county of Crow Wing, State of Minnesota, have invented certain new and useful Improvements in Locomotive Engineers' Alarms, of which the following is a specification.

My invention relates to mechanically-operated alarms; and the object of the invention is to provide means for sounding a bell or whistle in a locomotive-cab to warn the engineers when their trains have approached within a certain predetermined distance of each other, and thereby prevent any possibility of head or rear end collisions.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a locomotive and track, showing my invention applied thereto. Fig. 2 is a plan view of a track with my invention shown attached thereto. Fig. 3 is a longitudinal section of a track, showing the position of the alarm-operating mechanism thereon and operated by the movement of a train in one direction. Fig. 4 is a similar view showing the position of the mechanism when the train is moving in the opposite direction. Fig. 5 illustrates the position of the parts when a train is moving on the track toward the left, and Fig. 6 is a similar view showing the position of the mechanism when two trains are approaching each other. Fig. 7 is a detail view of a portion of a locomotive-truck, showing the manner of attaching the mechanism thereto. Fig. 8 is a plan view in detail of the mechanism arranged on the track and engaged by the part carried by the locomotive. Fig. 9 is a side elevation, partially in section, of Fig. 8. Fig. 10 is an end view. Fig. 11 is a view showing the part carried by the locomotive in the act of engaging the track apparatus and also showing a slight modification in the construction of the track mechanism. Fig. 12 shows a modified mechanism of Fig. 11 in its unlocked position. Fig. 13 is a section on the line $y\ y$ of Fig. 12.

In the drawings, 2 represents the ties, and 3 the rails, of a track of ordinary construction. Mounted upon the ties between the rails at suitable intervals along the track are standards or brackets 4, having arms 5 on each side, whereon bell-crank levers 6 are pivoted, said levers consisting of long arms 7, having downwardly-turned ends 8 and shorter arms 9, substantially at right angles to the long arms. Wires 10 are attached to the shorter arms 9 and pass over pulleys 11 and over the ties to corresponding arms of bell-cranks similarly located at a distance from said first-named levers. The distance between these levers may be varied to suit different conditions; but I prefer to divide the track up into sections or blocks of about one-half a mile in length and arrange the bell-crank levers at corresponding intervals, connected by the sections of wires that extend over the full length of the track that it is desired to protect. To avoid any possibility of two trains meeting at the abutting ends of two sections or blocks, I provide wires 10^a and a second series of bell-cranks 6^a, having the long and short arms 7^a and 9^a. The wires 10^a are arranged to break joints or overlap with the ends of the wires 10, so that, as shown in Fig. 2, the pairs of bell-cranks 6 and 6^a will be alternately arranged and about equal distances apart, and each crank 6^a is connected by its wire 10^a with the corresponding bell-crank of the adjacent pair. Each bell-crank is arranged so that its long arm 7 projects slightly above the level of the rails, and when one bell-crank is depressed the corresponding crank to which it is connected will be raised.

Between the pairs of bell-cranks mounted on the ties I provide standards 12, wherein hubs 13 are mounted and provided with radiating arms 14, which with said hubs form a device similar to the ordinary turnstile, except that it rotates in a vertical plane instead of horizontally, as is usually the case with a turnstile. The hub 13 is provided with a series of flattened surfaces 15, and springs 16, secured on the standards 12, are arranged to bear upon said surfaces as said hub is revolved and prevent the premature movement of the hub and also prevent it from making more than one step or movement with each

impulse. The wires 10 and 10ª extend parallel over the ties, and the arms 14 are arranged to extend down between the said wires, as indicated in Fig. 10. Upon these wires 10 and 10ª I provide stops 17 and 17ª, arranged upon opposite sides of said arms, one stop being clamped to one wire and slidable on the other and the other stop being reversely arranged. The stops are therefore movable with one wire toward said arms and slidable at the same time on the other wire. In Figs. 12 and 13 I have shown a slight modification in the arrangement of the stops, which consists in providing slots 18 in the standards supporting the hub 13 and providing rods 19, that are slidable in said slots and connected, respectively, with the stops 17 and 17ª by links 20. The object of providing this connection between the stops and the standards is to relieve the stops and wires of the shock thereon when the former are in their locked position and an arm is struck by a rapidly-moving train. The standards shown in Figs. 12 and 13 are also provided with guide-lugs 21 for the wires 10 and 10ª. These may be employed in connection with the standards 12 or not, as preferred.

On the axle 22 of the locomotive I provide a wheel 23, that is in position to engage the bell-crank levers with which one of the wires are connected and actuate the same to move the stops 17 or 17ª and lock the hub 13 against revolution. In Fig. 3 I have shown a lever at the left-hand end of the figure depressed by said wheel, while the lever with which said depressed lever is connected is raised above the level of the rails, as shown at the opposite end of the figure. In Fig. 4 I have shown the lever at the right-hand end of the figure depressed and the corresponding lever at the other end of the figure elevated. Depending from the locomotive-frame are links 24, carrying a rock-shaft 25, that is provided with arms 26, that are normally held in a retracted position by springs 27. An arm 28 on said shaft is connected by a rope 29 with a suitable valve device 30 in the locomotive-cab and connected with a whistle, or, if preferred, with the air-brake system, or with both. An arm 31 is also secured on the shaft 25 and depends therefrom in position to engage one of the arms 14. If one of the wires has been moved longitudinally by the depression of its bell-crank, a stop will be moved into the path of the arms 14 and the hub 13 locked against revolution in one direction. When, therefore, the arm 31 engages the arm 14 in the path thereof, said arm 31 will be oscillated, with its shaft, to sound the engineer's alarm. A stop 32 is preferably provided on one of the links 24 to engage the arm 26 and limit the oscillation of said arm 31. An antifriction-roller 33 is preferably provided at the lower end of the arm 31.

The following is a description of the operation of my improved engineer's alarm: Referring to Figs. 4, 5, and 6, we will assume that a train enters the block at the right hand of Fig. 4 and depresses the bell-crank at that point. This movement of the bell-crank will move the wire connected therewith longitudinally and set the stops secured on said wire in the path of the arms 14, as shown in Fig. 4. Then as the train passes over said arms the hubs 13 will be rotated one step and left in the position indicated at the right hand of Fig. 5 in engagement with the stop 17, which will lock the hub against further movement in that direction. As the train passes along over the block it will rotate the hubs and set the arms consecutively in their locked position, and the arms will remain locked until the train passes out of the block and depresses the bell-crank there to lift the one that was depressed when the train entered. This depression of the bell-crank at the end of the block will restore the one at the beginning and all the stops on the wire connected therewith to their normal position, and the hubs can then freely revolve. If, however, a second train moving in the same direction enters the block before the first one passes out of it, the arms 31 on the second train engaging an arm 14 that is locked will be actuated thereby and the valve in the locomotive-cab operated to sound the whistle or set the brakes and warn the engineer that the preceding train has passed out of the block. Each train therefore as it enters the block will set the track apparatus to warn the next incoming train moving in the same direction and each train as it passes out of the block will restore the track mechanism to its normal position. If two trains be upon the same track moving in opposite directions, one of them will operate one group of bell-cranks and wires to set the track mechanism, as described, and the other train will operate the other group to set the alternately-arranged mechanism, and it will be impossible for two trains to approach nearer than one block or section of each other moving in the same or opposite directions without alarms being sounded or the brakes being set in both locomotives.

In Fig. 6 I have shown the track mechanism operated or set by the approach of trains from opposite directions. The one moving toward the left will set the stops on one side of the arms 14 and the train moving toward the right will set the stops on the other side of said arms. Consequently when either one of the trains passes over an arm its shaft 25 will be rocked and the alarm sounded in the locomotive-cab.

The bell-crank mechanism will be exposed between the track-rails; but I prefer to protect and conceal the wires running along the ties in the different blocks by a suitable casing or covering 35, openings being made therethrough at suitable intervals for the projection of the standards 12 and the rotating devices carried thereby.

When a track is equipped with an apparatus of this kind, it will obviously be impos-

sible for two trains to enter the same block whether going in the same or opposite direction without a warning being given each engineer, so that they will have ample time to obtain control of their trains and prevent both head and rear end collisions. The apparatus is very positive in its action, not depending upon springs, electricity, or any other unreliable agent for its successful operation. If the operating parts of the mechanism are not broken or deranged, it must operate upon the passage of a train to set the actuating devices and sound an alarm or set the brakes upon the approach of another train.

I claim—

1. The combination, with a track, of levers arranged at intervals thereon, wires connecting said levers and arranged to be moved longitudinally by the operation thereof, one of said levers being raised by the depression of the other, rotating devices provided at intervals between said levers, stops carried by said wires and moved into the path of said rotating devices to lock the same when said levers are operated, and an alarm-actuating device carried by the locomotive and arranged to engage said rotating devices.

2. The combination, with a track, of wires strung along the ties and divided into blocks or sections, means connected to said wires at the ends of the blocks for moving said wires lengthwise upon the passage of a train, means carried by a locomotive for engaging said moving means, an alarm mechanism in the locomotive-cab, means carried by the locomotive for operating said alarm mechanism, and means provided on the track at intervals between said wire-moving means in the path of said alarm-actuating means and arranged to be locked by the longitudinal movement of said wires, substantially as described.

3. The combination, with a locomotive and the track, of wires strung along the track and divided into blocks or sections, levers connected with said wires at the ends of said sections, said levers being arranged to move said wires longitudinally when operated, and one lever being arranged when depressed to elevate the other lever connected with the same wire, means provided on the locomotive for engaging said levers, an alarm mechanism on the locomotive, and means provided on the track at intervals between said levers and locked by the longitudinal movement of said wires for actuating said locomotive alarm mechanism.

4. The combination, with a locomotive and the track, of wires arranged parallel thereon with their ends lapping by or breaking joints with each other and forming overlapping blocks or sections, levers connected with the ends of said wires respectively and arranged to move them longitudinally when operated, one lever being raised when the other connected with the same wire is depressed, means provided on the locomotive for actuating said levers, an alarm mechanism carried by the locomotive, and alarm-operating devices provided at intervals along said blocks or sections and arranged to be set by the movement of said levers for operating said alarm mechanism upon the passage of a train.

5. The combination, with a locomotive and the track, of bell-cranks arranged in pairs at intervals on the ties, flexible connections provided between the opposite arms of said bell-cranks, the other arms being arranged to project above the rails to be actuated by the passage of a train, means carried by the locomotive for engaging and operating said bell-cranks, one of them being elevated while the other connected therewith is depressed, an alarm mechanism carried by the locomotive, and an alarm-actuating mechanism provided on the track at intervals between said bell-cranks and arranged to be set by the operation of said cranks to actuate said mechanism upon the passage of a train.

6. The combination, with a locomotive and the track, of wires divided into overlapping blocks or sections, bell-crank levers provided at the ends of said sections and connected with said rails, one lever of a section being elevated while the other one connected thereto is depressed, means provided on the locomotive for engaging and depressing said levers, an alarm mechanism carried by the locomotive, hubs having a series of radiating arms mounted at intervals between said levers, and stops provided on said wires and arranged to be moved into the path of said arms upon the depression of said levers, substantially as described.

7. The combination, with a track, of a mechanism arranged in blocks or sections of predetermined length and comprising revolving members, and means controlled by the entrance into and departure of a train from a block for alternately locking and releasing said members, and means on an approaching train arranged to be actuated by said track mechanism to sound a warning when a second train enters a block before said first-named train has departed therefrom.

8. The combination, with a track, of an alarm-actuating mechanism dividing the track into blocks or sections, said mechanism comprising revolving members, and means controlled by the entrance into and departure of a train from a block for alternately locking and releasing said members, and an alarm mechanism provided on each locomotive arranged to be operated by said members to sound an alarm when two trains approach one another within a certain predetermined distance and moving in opposite directions.

9. The combination, with a track, of a mechanism dividing the track into sections or blocks and comprising revolving hubs having radiating arms, and means controlled by the entrance into and departure of a train from a block for alternately locking and releasing said hubs, and an alarm mechanism provided on a locomotive and arranged to be

operated by said actuating mechanism to sound an alarm when two trains approach one another within a certain predetermined distance and moving in the same direction.

10. The combination, with the track, of an alarm-actuating mechanism dividing the track into sections or blocks, said mechanism comprising revolving hubs having radiating arms and stops therefor, means arranged to be operated by the approach of a train for setting said actuating mechanism in its operative position, and an alarm mechanism provided on the locomotive and arranged to be operated by said actuating mechanism to sound an alarm when two trains approach one another within a certain predetermined distance and moving in the same direction.

In witness whereof I have hereunto set my hand this 9th day of April, 1903.

ERNEST WATSON.

In presence of—

F. L. BANNON,

A. T. LARSON.