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# W. T. CRAWFORD.

## AUTOMATIC RAILROAD GATE.

No. 529,637. Patented Nov. 20, 1894.

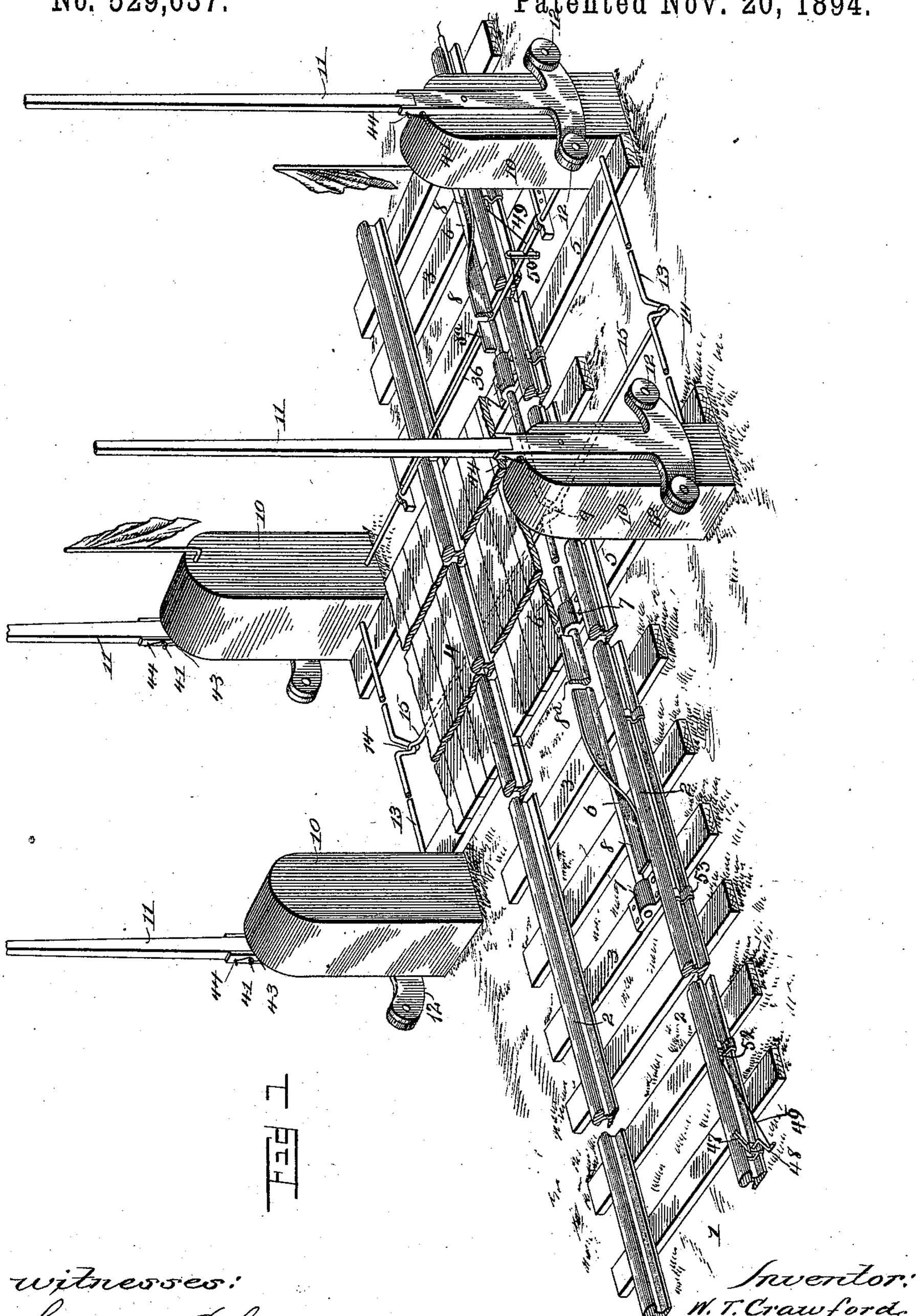

FIG. 1.

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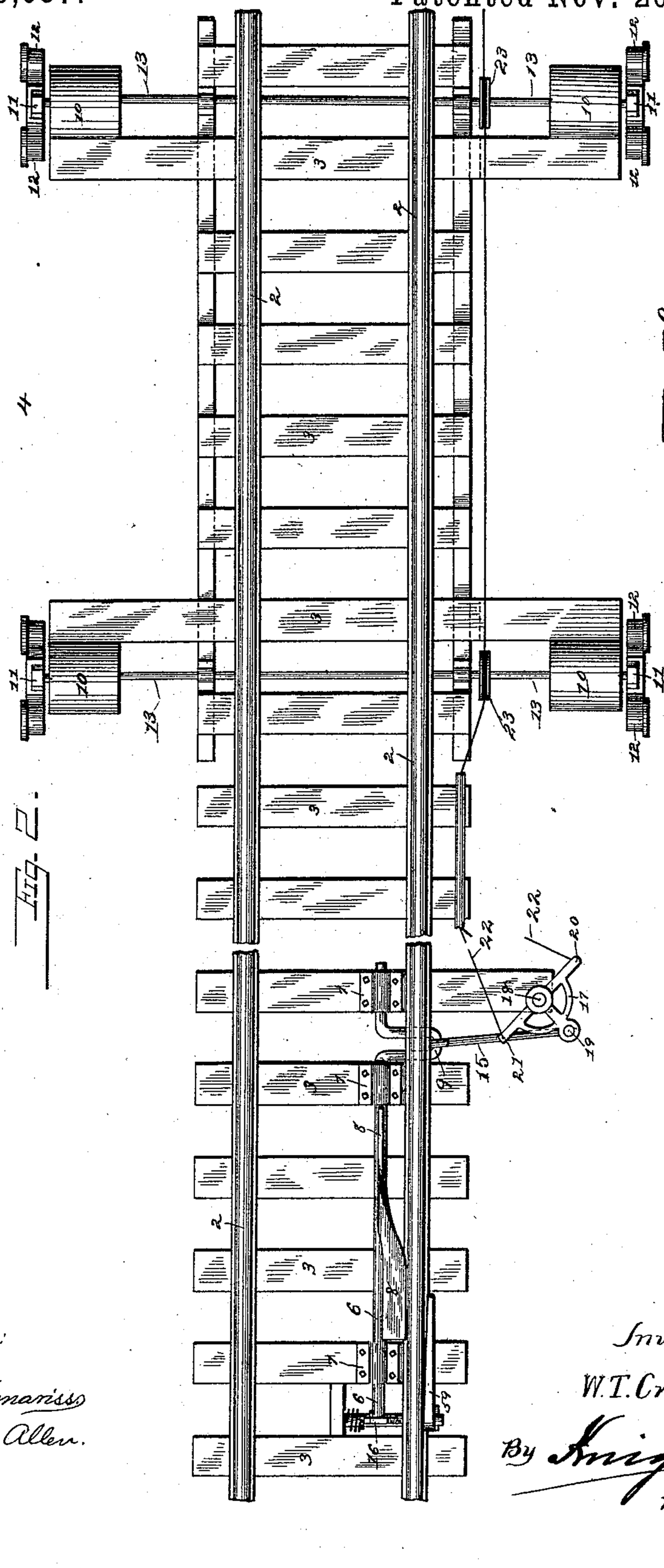

Fig. 2.

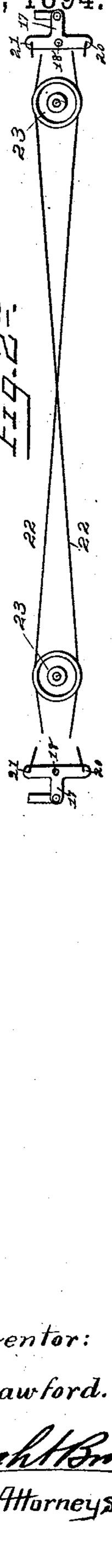

Fig. 2a.

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## AUTOMATIC RAILROAD GATE.

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Fig 3

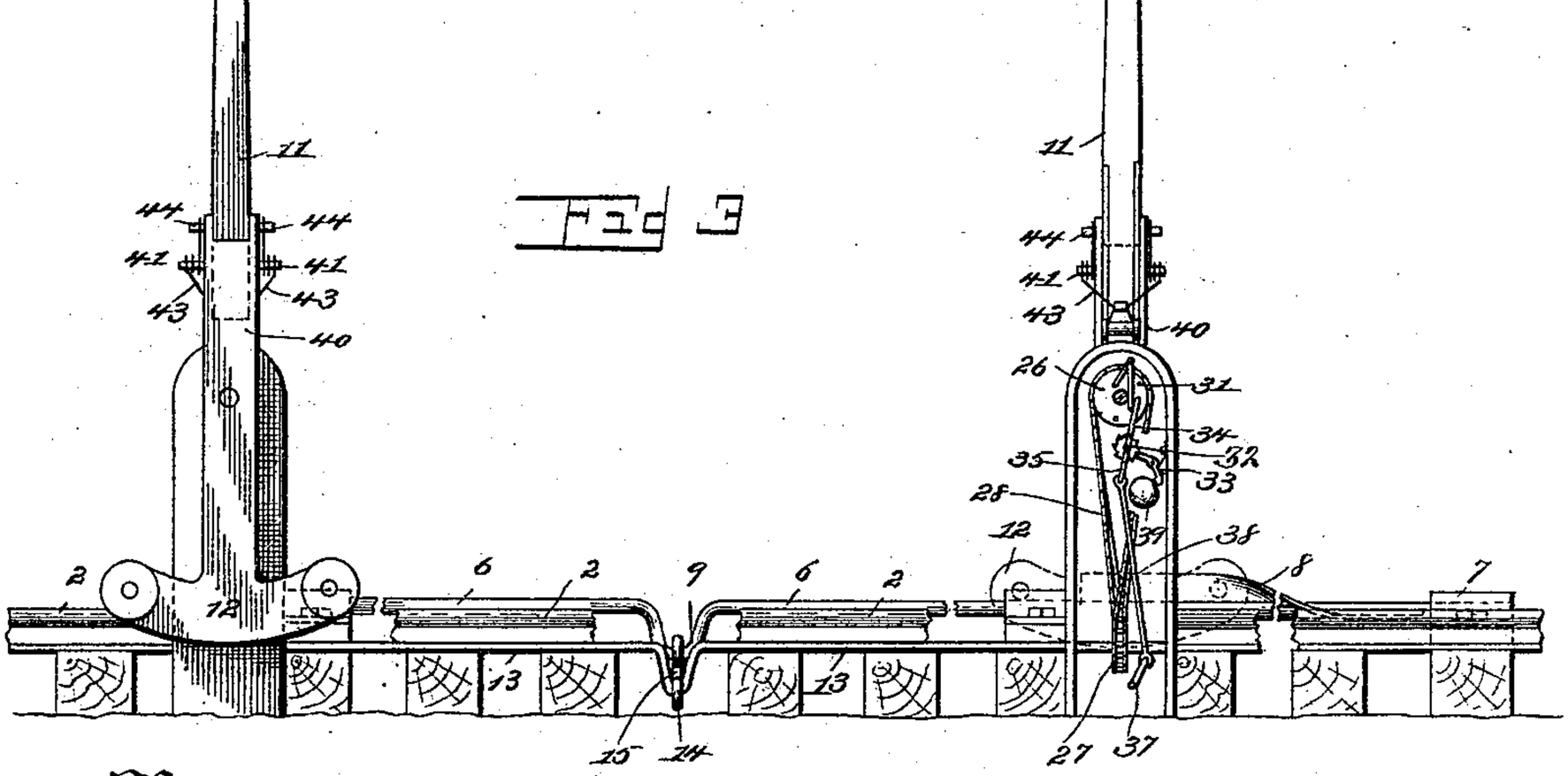


Fig 4

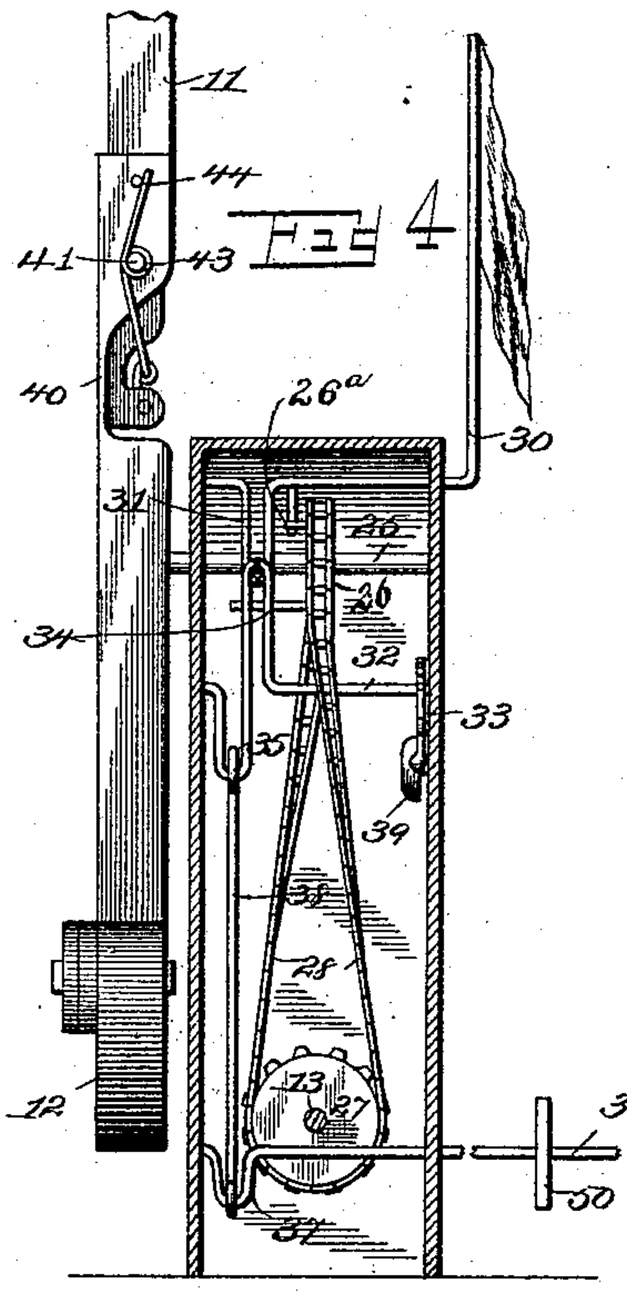


Fig 5




Fig 6




Fig 7




Fig 8

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## AUTOMATIC RAILROAD GATE.

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Fig 9

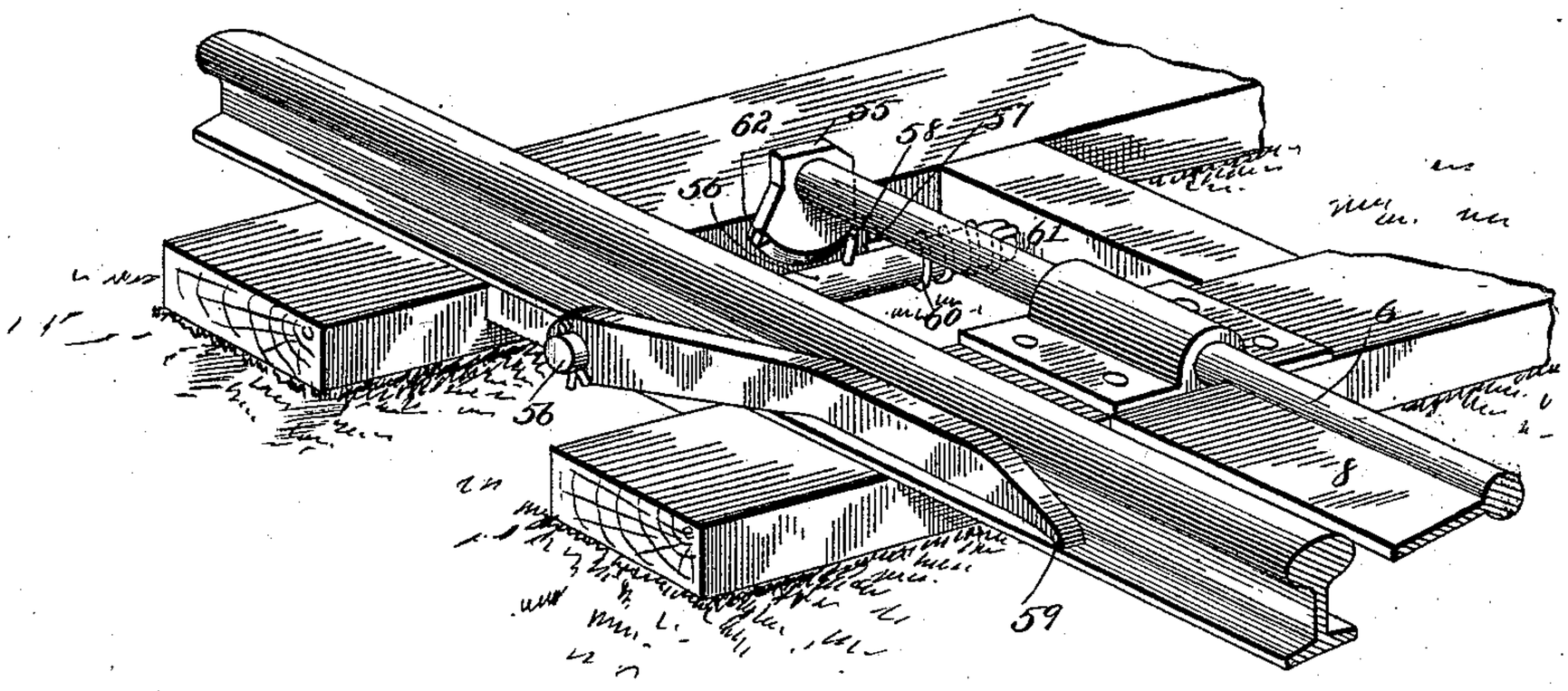



Fig 10

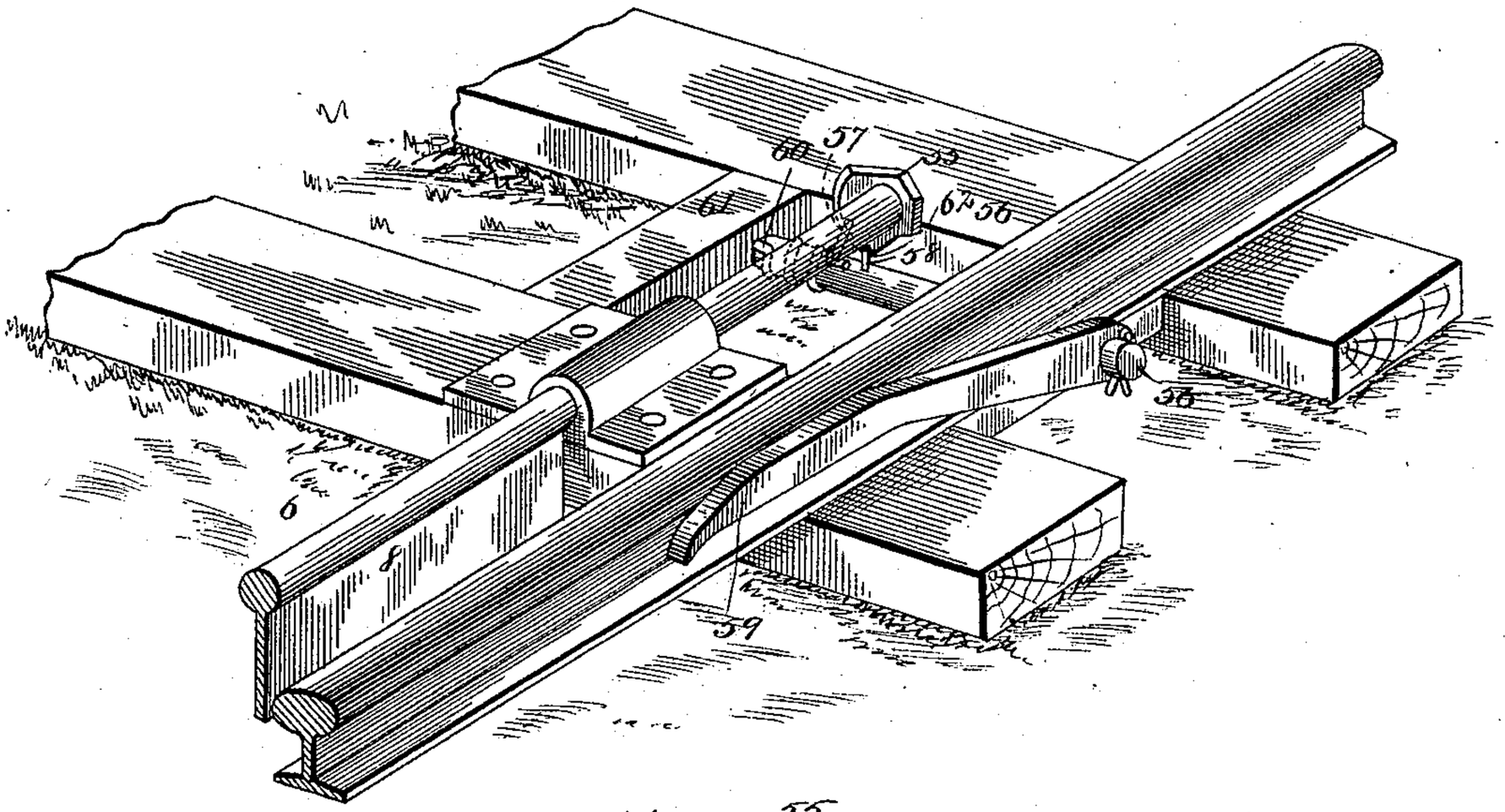
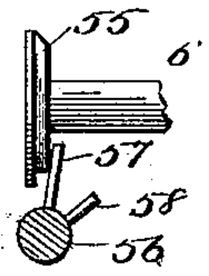



Fig. 11.

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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC RAILROAD-GATE.

SPECIFICATION forming part of Letters Patent No. 529,637, dated November 20, 1894.

Application filed November 11, 1892. Serial No. 451,707. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM T. CRAWFORD, a citizen of the United States, residing at Tampa, in the county of Hillsborough and State of Florida, have invented new and useful Improvements in Automatic Railroad-Gates, of which the following is a specification.

The object of my invention is to provide a simple mechanism, which will be operated with certainty by a passing train to close the gates as it approaches the crossing and to open them again as the train moves away without sudden or spasmodic action.

The invention will be fully understood upon reference to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective view of a railway crossing to which the simplest form of my invention is applied. Fig. 2 is a plan view showing a modification in the working connections which may be utilized when the actuating mechanism which receives the impact of the car wheels is located at a distance from the gates, in order to cause the lowering to take place a sufficient time before a fast train reaches the crossing. In this view one of the two similar opposite ends of the actuating mechanism is omitted. Fig. 2ª is a side elevation of the form of working connections used in Fig. 2. Fig. 3 is a side elevation of the arrangement shown in Fig. 1. Fig. 4 is an enlarged end elevation of one of the gate posts, one wall being removed to disclose the parts within. Fig. 5 is a detail view of one of the safety joints, which adapt the gates to open outwardly and permit escape from within. Fig. 6 is a detail view of the alarm actuating treadle. Fig. 7 is a detail view of the clamp for attaching the tube or conduit through which the flexible connections are led. Fig. 8 is an enlarged detail view of the flag and gong operating connections. Figs. 9 and 10 are enlarged perspective views of the locking devices at opposite ends of the system, and in different positions. Fig. 11 is a detail view showing the cam in position not to be locked by engagement with one of the pins.

Fig. 1 illustrates a form of my invention especially adapted for use at crossings where trains pass at slow speeds.

1 represents the railway track formed of rails 2, on cross-ties 3, and 4 a crossing in said track, which may be built or laid upon the extended cross-ties 5.

6 represents a longitudinal rock-shaft mounted in bearings 7, alongside one rail and provided with a radial fin 8, 8ª, extending from each end to the crossing, and an intermediate crank 9 at the crossing. The radial fin 8, 8ª, is arranged spirally for a distance from each end and for the remainder of the way, is straight. It is located in such position that the engine and car wheel flanges will engage and depress the fin, causing a slow rotary movement of the rock shaft, and the spiral portion 8 is arranged at such pitch that the rotary movement will be continued for a quarter or half revolution. The rock shaft and its fins with the working connections constitute the mechanism which operates the gates. The rock shaft extends on either side of the crossing, a distance sufficient to insure the lowering of the gates in ample time before the passing of the train. The rotation of the shaft is accomplished by the complete traversing by the train of the spiral part of the fin, and it is therefore obvious that by lengthening this part of the fin, the movement of the gates may be rendered as slow and gradual as desired. From the end of the spiral portion 8, of the fin the straight portion 8ª continues toward and terminates at the crossing, and serves by receiving the wheel flanges to hold the shaft in its rotated position, and through the shaft to hold the gates in lowered position. For slow speeds it may be found sufficient if the spiral portion 8 of the flange extends for forty or fifty feet, and the straight portion continues fifty or sixty feet to the crossing, but these dimensions may be changed as experience dictates.

10 represents four posts or standards upon which are pivoted vertically swinging gates 11 having counter-balances 12, and 13 represents controlling shafts which have cranks 14 and operating mechanism to be hereinafter described, located within the posts.

15, are pitmen which connect the crank 9 with each of the cranks 14, and thereby cause the shafts 6 and 13 to rotate synchronously.

The parts are arranged, as will hereinafter more fully appear, so that when a train ap-

proaches from either direction the rock-shaft will be rotated a sufficient part of a revolution to cause the gate axis to rotate a quarter revolution and bring the gates from vertical to horizontal position. In order to hold the gates in such position till the train passes, when going at slow rates of speed the radial fins are made to extend the whole length of the rod except the width of the street, and portions of the fins are made straight in order to hold the shaft without further turning it. When the train has passed, the gates resume a vertical position. The break in the fin immediately at the crossing does not permit the gates to return, even though but an engine be passing because the latter is of sufficient length to prevent all the wheels being out of engagement at one time.

In Fig. 2 is shown an arrangement adapted for use where trains pass at high rates of speed and it is necessary to set the flanged rock shaft off a great distance from the crossing. It is similar in principle to that shown in Fig. 1, but the rock-shaft is divided into two parts (one only being shown) located on opposite sides of, and a sufficient distance from the crossing, and each having a crank 9. Motion is transmitted from each of the separate shafts by means of double bell-crank levers 17 pivoted at 18, and having their middle arms 19 connected by pitmen 15 with cranks 9, while their two arms 20, 21 are connected in pairs by crossed belts 22. In this form of apparatus, the gate-controlling shafts 13, pass under the track and connect opposite gates in pairs. Upon these shafts 13, instead of the cranks, are fixed pulleys 23 which receive belts 22. When the fin 8 at either end receives the impact of the wheels, the rock-shafts and bell-cranks are rocked, being coupled together, and the belt causes the pulleys 23 to rotate with their shafts 13 so as to lower the gates. At the same time the locking device at the end opposite the approach, automatically locks the gates in horizontal position, that at the end of approach being prevented from operating as will hereinafter appear, and the gates remain lowered till the train passes off, and releases the locking device at the end of departure. This form may also be used for short connections if more convenient, as at curves.

The construction of the gates will be more fully understood upon reference to Figs. 3, 4 and 5. The post 10 is a hollow box of sufficient size to accommodate the flag alarm, and gate-operating mechanism, and in it are mounted the gate-axis 25, having pinion 26 and a sprocket-wheel 27 connected with the pinion 26 by a chain 28. The relative size of the pinion and the sprocket is such as to require but a slight movement of the latter in order to effect the lowering of the gates. Within the gate posts or in one or two of them are also mounted the flag-shaft 30 having crank 31, the gong 39, the alarm-shaft 32 engaging clapper 33, and having crank 34, which engages crank 31, and crank 35, which is connected by pitman 38, with the crank 37 of the alarm controlling shaft 36.

Each gate-arm is preferably formed at its inner end with a casting 40, which carries the counter-balance 12, and in which is pivoted, at 41, the arm 42. A spring 43 coiled around opposite ends of the pivot 41, on the casting 40 is connected at 45 to the inner end of the arm and keeps said arm normally straight with a yielding pressure. The gate thus formed is mounted so that the arms break outward though the shape of the castings is such as to resist bending inward. With such construction, an animal being caught between the gates when they are automatically lowered, may readily escape. In thus forming the gates, the casting forms a box in which the arms work, and the arm is provided with a cast metal shoe 46, on its inner end, which adapts the arm to work in the box-casting, and which receives the wear.

The alarm is operated by the treadle 47 journaled on the side of one of the rails and having a crank arm 48 connected by wires 49 with a crank 50 on the alarm-controlling shaft 36. The adjustment of these parts is such that each wheel striking the pedal sends an impulse to shaft 36. By each impulse the alarm-shaft is rocked, causing the clapper to strike the bell, and releasing and returning the flag-shaft, so that it falls and rises repeatedly. The crank 31 of the flag-shaft and crank 34 of the alarm-shaft are connected by a flexible connection $34^a$, and each time the pedal rises, after being depressed by the wheel, and the shaft 36, and alarm-shaft return to normal position allowing the flag-shaft to fall back to horizontal position. Repetition of this operation causes a vigorous ringing of the bell and waving of the flag. The connectors between the treadles 47 and cranks 50 are passed through tubes 52 which are held to the side of the rail by clamps 53 as shown in Fig. 7. This operation continues till the train reaches the gate motor where the gates are lowered. By referring to Fig. 8 it will be seen that the gear wheel 26 is provided with two pins $26^a$ and $26^b$ on one of its faces. The flag shaft 30 has a setting arm $30^a$ which projects across the path of the pin $26^a$ and the crank 34 of the alarm shaft 32 projects across the path of pin $26^b$. When the gates are lowered, the flag-shaft-crank and the alarm-shaft-crank are engaged by the respective pins and forced to the position shown by dotted lines in Fig. 8. When the gates return, the parts are released, but the alarm-crank engages behind and retains the flag-shaft in normal position, until the parts are again released by the initial impulse given by the next approaching train.

The locking devices which are located at the respective ends are precisely similar in construction and each consists of a peculiarly formed cam 55 on the end of the flanged rock-shaft 6, and a transversely arranged rock-

shaft 56, having pins 57, 58, releasing treadle 59 and spiral spring 60, one end of which spiral spring is fixed to the bearing 61, of the rock-shaft, while the other one engages one of the pins. The pins are spaced apart both longitudinally and circumferentially on the rock-shaft 56, the circumferential distance between them being sufficient to admit the cam 55. 62 represents a notch in the cam into which the pin 58 may engage when the cam passes between the pins to its lower limit of movement, and while the pin 57 is therefore not engaging the cam; but when the pin 57 is first forced to a position behind the cam, and the latter then moves to its lower limit, the location of the pin 57 is such that it not only does not itself enter notch 62 but it also keeps pin 58 from entering said notch. This locking device will operate to lock the flanged rock-shaft only at the end where the train leaves, that locking device at the approach end being prevented from taking effect as will now appear.

The two rock-shafts at opposite ends of the system are connected in such manner, either by the rod being made continuous or by the connection between its parts hereinbefore referred to, that the flanges at opposite ends are always in the same relative positions and move simultaneously when the wheels impinge on either. As will be understood with reference to Figs. 9 and 10 when the train approaches the end shown in Fig. 9, the first wheels strike the releasing treadle 59 so as to cause the pin 57 to move on the inside of the cam 55 as shown in Fig. 11 and immediately thereafter the impingement on the flange depresses said cam to its lower limit of movement. This lower limit of movement, however, is not such as to permit the pin 57 to engage in the notch 62 and neither pin therefore engages the cam in such manner as to prevent the ready return of the rock-shaft by the counter-balance weights of the gates; but while the locking device at the end of approach is prevented from operating, that located at the end of departure does operate until the train passes away, because at said end of departure, the pins are not previously moved and as the cam 55 is depressed it passes between said pins so that as soon as the notch 62 coincides with the pin 58, as shown in Fig. 10, said pin engages in the notch and prevents the cam returning. The gates are thereby locked in lowered position and remain so until the train passes the crossing and the last wheel of the train reaches the releasing treadle 59 at the end of departure. As this takes place the treadle is depressed sufficiently to release pin 58 from notch 62, but no farther, and the cam, together with the rock-shaft, is freed and returned to normal position by the effect of the counter-balance on the gates. From the foregoing it will be seen that precisely the same device is used at either end, that the system may be approached in either direction and that the locking only takes place at the end where the train leaves the system.

It will be seen that the gates are positively operated by a slow and gradual movement notwithstanding the rapidity at which the train passes, and that they are released together with the operating mechanism when the train is passed and automatically assume their normal positions.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination of a counterbalanced arm adapted when free to occupy a normal position, actuating devices located on each side of the arm and operatively connected together and to the said arm, a locking mechanism for each arm actuating device normally occupying an operative position, and a trip for each locking mechanism so disposed that the approaching train will operate the trip on the approach prior to operating the said arm actuating device and throw the lock connected therewith out of operative relation, the arm actuating mechanism when operated being held by the lock at the departure side, and the trip at the latter side being operated by the departing train to release the said arm actuating devices, substantially as described.

2. The combination of a supporting post; counterbalanced vertically swinging gate-arms, having spring-joints; a bell; a movable flag-staff; operating devices within the post for the gate-arm, the flag-staff and the bell; a spirally flanged rock-shaft journaled along one of the track-rails; connections between the rock-shaft, and the gate operating devices within the post; a pedal located beside the track beyond the rock-shaft; and flexible connections from the pedal to the bell and flag-operating devices, all substantially as shown.

3. The combination with gate arms arranged to return automatically to their open position, of a spirally flanged crank-shaft at each side of the crossing; connecting mechanism between the crank-shafts whereby they are compelled always to move together; an automatic locking-device at the outer end of each shaft consisting of a grooved and notched cam-wheel, 55, thereon, together with a transverse rock-shaft, 56, having pins 57 and 58 to engage said cam-wheel, and a returning spring 60; and a relieving arm on shaft 56, by which the pins are released from the cams as the train is departing; substantially as shown.

4. The combination of the two, flanged crank-shafts; the notched and grooved cam-wheels on the outer ends of said shafts; the two transverse rock-shafts, provided with pins for engaging the cam-wheels; the relieving arms; and the lever and cable connections uniting the two sets of devices to each other and to the guard devices at the crossing, substantially as shown.

5. The combination of movable arms pivoted on suitable standards; a flag-staff; flag

operating mechanism located in said standards; apparatus located on the track for operating the arms from a distance; and track irons more remote from the crossing for actuating the flag operating mechanism; all substantially as shown.

6. The combination of the gate arms; the flanged crank-shafts located at a distance from the crossing, one on each side thereof; working connections between said shafts whereby they move in unison; cams on the outer ends of said shafts; rock-shafts located transversely between the rails, having pins for engaging the cams; springs on the latter shafts; and bearings therefor; all substantially as shown.

7. The combination of the pedal 47; the crank-shaft 36 oscillated thereby; the flag shaft 30 the double crank shaft 32; the connections between the cranks of the said three shafts whereby the oscillations of shaft 36 are transmitted to the flag; the arm $30^a$ projecting from the flag-shaft; the wheel on the gate shaft and the two pins $26^a$ and $26^b$ projecting therefrom all substantially as shown.

8. A gate arm, consisting of an inner pivoted and weighted section 40, having ears at its outer end; an outer section 42, pivoted between said ears; and a spring loop 43, bearing against the inner end of arm 42, and having its ends coiled around the ends of pivot 41 whereby the two arms are normally held in line with each other, all substantially as shown.

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