W. WICKERSHAM.

Improvement in Railway-Signals.

No. 129,877. Patented July 23, 1872.

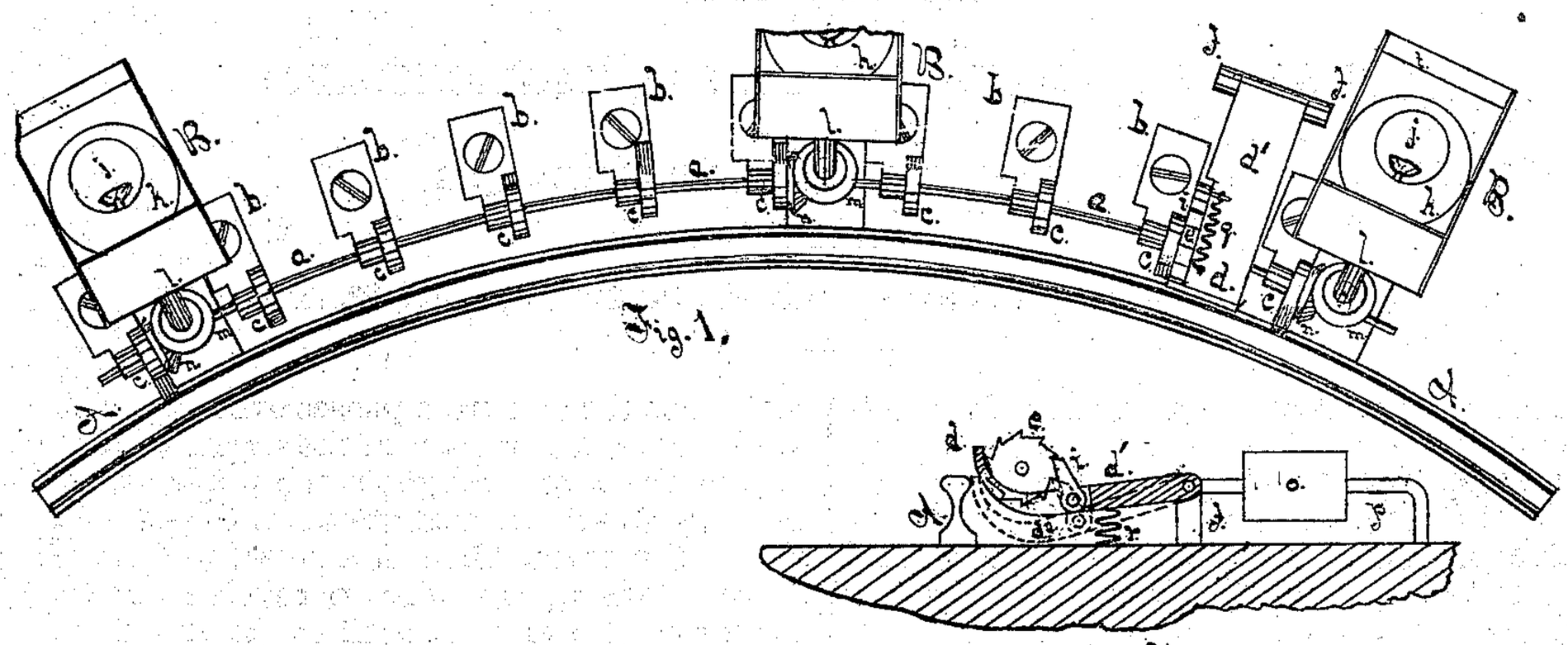

Fig. 1.

Fig. 2.

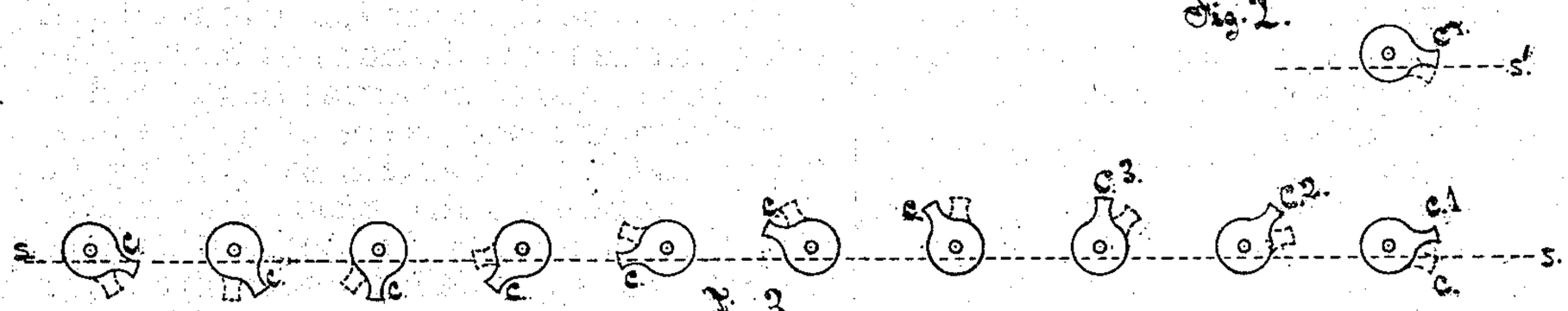

Fig. 3.

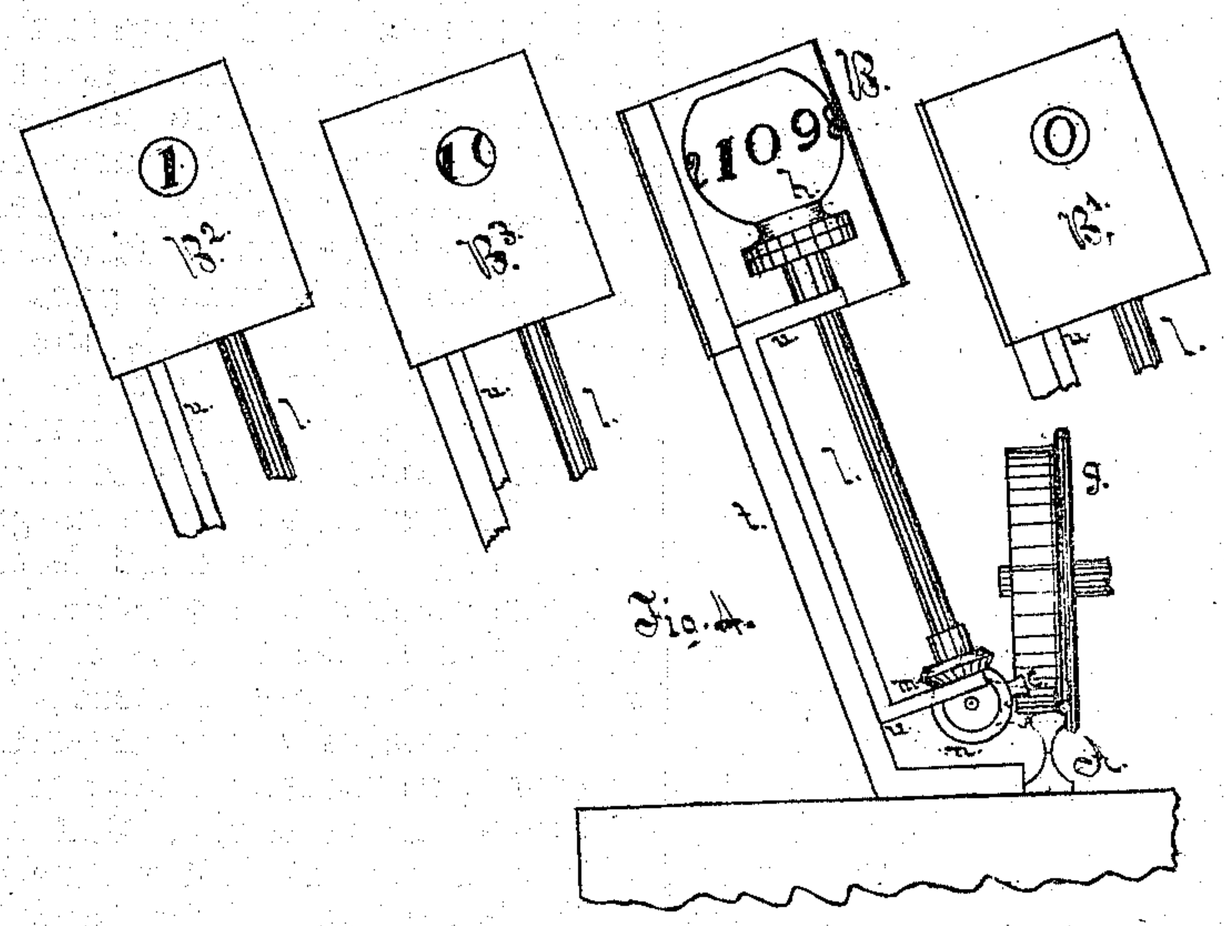

Fig. 4.

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IMPROVEMENT IN RAILWAY-SIGNALS.

Specification forming part of Letters Patent No. **129,877**, dated July 23, 1872.

Specification describing certain Improvements in Safety-Signals for Railroads, by WILLIAM WICKERSHAM, of Boston, in the State of Massachusetts.

The purpose of my invention is to prevent accidents on railroads from the following causes: First, when roads of a single track have short curves, or from any other cause are so situated that two approaching trains moving in the opposite direction cannot be seen, one from the other, until they approach to within a short and dangerous distance, so that a mistake in time, defect in time-keeper, or carelessness in the conductor may bring two trains so near without seeing the danger that a collision is unavoidable. Second, where, on roads of double or single track, the cars are going in the same direction and trains from short curves or other cause cannot be seen, one from the other, only for a short distance, and from the train ahead being behind time, or the following train being ahead of time, or from both these causes, an accident is liable to occur from collision. In the first of these cases I establish a series of signals on each portion of the roads where accident is liable to occur, so that the first train entering onto this portion of the road will automatically signal to the other end, so that an opposite train coming up to the first signal will not only see that a train has entered onto the opposite end of the signaled portion of the road, but can see also the distance it has advanced or the number of signal-stations it has already passed. In the second case I establish a series of signals over such portions of the road needing them in such manner that the following train, when approaching the first signal-station of any series, can see if the train ahead has passed the whole series, and if not, how far it has advanced—that is, to what station in the series—which will determine whether the following train shall stop or proceed.

The first feature of my invention relates to the device for taking motion from the car-wheel and communicating it to every station of the series, and consists of a wire near and parallel to the track, whether straight or curved, suitably supported by bearings, so that it can revolve freely, furnished with arms at intervals, projecting from it, and arranged so that when the first train passes over the track it will move the first arm of the series, thereby revolve the wire throughout the whole series, moving the arm at next station into position, so that the train, when it arrives, will move it also, causing the wire to revolve further and bring the arm in position at the third station to be moved when the train reaches it as the first and second, and so on through the whole series, one of the arms being moved at each station, and each one revolving the wire, and the last one in the series so revolving the wire as to cause the first arm in the series to be placed in position for the next train to move it, and to move all the other arms in the series in turn as the train advances through the series, as before described. The second feature of my invention relates to the method of signaling from the revolving wire, and consists in an upright shaft, connected with the revolving wire by gears or otherwise, on the upper end of which there is a glass globe, or globe made of some transparent or translucent substance, with figures on the outside indicating the progress the cars are making over the signaled part of the road, zero (0) denoting the state of the road before the train has entered onto the signaled part, or after it has passed entirely over it, the figures being covered by a case, except the number indicating the last signal-station passed by the train, until it has passed the signaled portion of the road, and then the globe will show zero (0) again. The third feature of my invention relates to my method of indicating, by the signal, the time of the passage of the last car of the train instead of the first one, and consists of a bar extending along the track of greater length than any of the spaces between the wheels, so that when the first wheels press it down it will be held down until the last wheels of the train leave it, when it will be raised up by spring or weight, and by so raising up a pawl attached to it will turn a ratchet on the revolving wire *a*, causing said wire to turn, thereby bringing another number to be seen as the signal that the train has passed the station indicated by that number. The fourth feature of my invention relates to a method by which both the approach of the train to a signal-station and the passage by it of the last car are indicated, and consists of a

combination of the first and third features, as described.

Figure 1 is a plan view of my signal, showing the two plans of turning the wire extending between the stations. Fig. 2 is a perpendicular and sectional view of the arrangement by which the time of the last wheels of the train, as well as the first, are indicated by the signal. Fig. 3 shows the position of the arm on the revolving wire at each station before the train enters onto the signaled part of the road. Fig. 4 is a side elevation, showing the globe on which the figures are placed with one side of the case taken off; also showing one with the case on, and another indicating the passage of the first wheel of the train by the station.

A is the rail. B is the case around the translucent globe having the indicating-figures. *a* is the revolving wire, extending from one station to another. *b b*, &c., are the bearings supporting the wire *a*. *c c*, &c., are the arms and their hubs on the wire *a* at each station, on which the car-wheels act as they pass over the track. *d* is a bar of metal, extending along the rail close by its side, in length equal, at least, to the widest space between the wheels in the train. This bar is supported by the support *d'* hinged to bearings *f f*. *e* is the ratchet-gear on the revolving wire, which is acted on by the pawl attached to the support *d'*, all working together in such manner that when the car-wheel passes over the rail A the bar *d* is forced down to a level with the top of the track, and the pawl *i* is moved down one notch on the ratchet-gear *e*, and, as the bar *d* is long enough to reach from one wheel to another of the train, (one wheel always coming into it before the next one in advance leaves it,) it is held down until the last wheel of the train leaves it, when it rises up, causing the pawl *i* to turn the ratchet-gear *e* and the revolving wire *a* the distance of one tooth. *g* is the car-wheel. *h h*, &c., are the glass globes on which the figures are placed indicating the station last passed by the train. *j j* are the gas-jets inside of the globes *h h*. *l l* are shafts supporting the globes *h h*, on the lower end of which are gears *m m m*, which are turned by the gears *n n n* on the revolving wire *a;* and these gears are of the same size, and so connected as to cause the shafts *l l l* to revolve once around when the wire *a* revolves once around. *o* is a weight on the arm *p*, attached to the back end of the support *d'* in such manner as to keep *d* in its upper position when the car-wheels are not holding it down. *q* is a spring to keep the pawl *i* in its place. *r* is a spring, which may be used instead of the weight *o*, if found more convenient. *s* is a dotted line, indicating the height of the top of the rail. *t* is a post or support for the shaft *l* and the globe, and *u u* are bearings for it.

Having described the parts, I will describe the operation of my signal, as follows: First, I will explain the operation of my signal when the arm *c* is the only part coming in contact with the car-wheels, indicating only by the signal the time the first wheel of the train reaches the station. Secondly, I will explain the operation when the bar *d* is substituted for the arm *c*, making the signal indicate the time that the last wheel leaves the station. Thirdly, I will explain the operation of my signal when both arms *c* and the bar *d* are used, making the signal indicate the time that the first wheel of a car reaches a station, and also the time the last wheel leaves it.

First, the wire *a* is fitted into the bearings *b b b* so that it will turn freely around, whether in a curved form or straight, and there is placed on it, at each station, one of the arms *c*, and these are fastened onto the wire *a* so as to turn with it, and they are adjusted on the wire, as shown at Fig. 3, where the position of each arm *c* on one wire is shown, making one series of signals, revolving the wire once around by the train passing over the series, so that when it approaches the first signal-station the first car-wheel presses onto the arm c^1 and moves it down to the dotted line *s*—that is, to a level with the top of the rail—its position being dotted, as shown at *c*, just below the line *s;* and, as all of the arms *c* in the series are fastened onto the same wire, they will all be moved to a second position, which is shown by the dotted lines; and after the train has passed the first station they will all remain in their second position until the train reaches the second station, when the car-wheel will throw c^2 to the line *s*, which was the same elevation above the track as c^1 was before the car-wheel approached it, and by c^2 being brought to a level with the track c^3 is brought to the same position as c^1 was before the car-wheel approached it, and so on to the end of the series; and at each station, in this case, all of them are caused by the car-wheels to move one-tenth of a circle, and, as there are ten in the series, they are caused to revolve entirely around by the cars passing over the whole series, leaving c^1 in its first position ready for another train to perform a like operation with them. In Fig. 4 the car-wheel *g* is approaching the arm *c*, which it must carry down to a level with the rail by passing over it, and as the gear *n* works into the gear *m* on the shaft *l*, to which the globe *h* is fastened, the globe must turn one-tenth of a round, and instead of presenting zero, (0,) as at B^1, it will present 1, as at B^2, and each successive station which the cars pass in their progress through the series presents a higher number, until, having passed the whole series, zero (0) is presented again. One of these globes may be at every station, if needed; though I have placed them at only part of them in the drawing. The globes *g* should be of ground glass or translucent porcelain, so that the gas-lights *j j* will show the figures plainly after night. The stations may be quarter or half of a mile or any convenient distance apart.

Secondly, I will explain the manner in which I make the signal indicate the time that the

last wheel of the train leaves the signal-station. The bar *d*, having a support hinged at *f f*, extends along the track and close enough for the car-wheels to pass over the top of it and press it down, as shown at d^2 by dotted lines, and of sufficient length, so that it will be kept down from the time it is moved down by the first wheel of the train until the last wheel leaves it, and then said bar *d* is caused to rise up to its first position by the weight *o* or the spring *r*, and the pawl *i*, which was brought below another tooth in the ratchet when *d* was pressed down, will turn the ratchet-gear *e* and the wire *a* by *d* being raised up, and, as before explained, through the gears *n* and *m* and the shaft *l*, the globe *h h* is turned around one-tenth of a circle, so as to present figure 1 instead of zero (0) after the cars pass the first station, and to present one higher number for each station the train passes until it has passed the signaled portion of the road, and then zero will again be presented.

Thirdly, I will explain my method of indicating by the signal the first approach of a train to the station, and the passage of the last car by it. I accomplish this by a combination of the first and second methods—that is, I have at each station an arrangement as shown in Fig. 2, the arm c^4 only one-twentieth of a circle above the top of the rail, and also the bar *d* with the ratchet *e* and the pawl *i*, so that when a train approaches a station the first car-wheel will move the arm c^4 down to *s'*, causing the globe *h* to turn, as before explained, only half-way from one figure to the next, or half-way from zero (0) to the figure 1, as shown at B^3, and this presentation is shown through the whole series, indicating that the first car-wheels have arrived at the station; then, after the train has passed over, and the last wheels of the last car have left and released the bar *d*, it rises up, turning thereby the ratchet *e* and the wire *a* and the globe *h* another twentieth of a circle, causing figure 1 to be presented, as at B^2, Fig. 4, so that whenever it is desirable it can be seen at any signal-station, both the arrival and leaving of the train, and the time of arrival and leaving of each train at each station may be automatically registered by having a sheet of paper placed on a revolving cylinder under a pen which moves from one end to the other in twenty-four hours, and so connected with the wire *a* that the pen shall be raised from the paper or moved laterally at every arrival or departure at the stations of the trains; but as the method of doing this is well known it need not here be described.

It is proper to say here, that my method, as just described, is peculiarly fitted for signaling around curves, and, indeed, for every use needed by railroads; it is simple and effective, and will cost but a fraction of that of other methods in use, and can be used for purposes which no other method hitherto devised will answer. Signaling around curves is done simply by having the wire *a* curved to suit the curve of the road, as shown in Fig. 1.

Having thus described my invention, I will state my claim as follows:

1. I claim, in safety-signals for railroads, a series of arms, *c c c*, &c., in combination with the wire *a*, to which they are attached, constructed and arranged as described, so that a train in passing over the signaled part of the road shall successively press the arms of the series down, and so that when the train has passed the whole series one of the arms at the begining of the series shall be in the right position for the next train to press down, as before described, the movement of each arm in the series causing said wire to move in the same direction, as and for the purpose set forth.

2. I also claim the globe *h* with its indicating figures, in combination with the wire *a* and the intermediate gears *m* and *n* and shaft *l*, substantially in the manner and for the purpose set forth.

3. I also claim the device for turning the wire *a* part of the way around when the last car is leaving the signal-station, consisting of the bar *d*, the pawl *i*, and the ratchet-gear *e*, substantially as described, and for the purpose set forth.

4. I also claim the device for turning the wire *a* part of the way around at the time the train approaches any particular station, and part of the way around at the time the train leaves the same station, consisting of the arm *c*, in combination with the bar *d*, the pawl *i*, and the ratchet-gear *e*, substantially in the manner and for the purpose set forth.

5. I also claim a series of arms, *c c c*, connected to and in combination with a curved wire, *a*, constructed and arranged as described, for signaling around curves in railroads, substantially as described, and for the purpose set forth.

6. I also claim an arm, *c*, attached to the wire *a*, constructed and arranged as described, so that said arm will revolve and move downward only when on the side next to the rail, in contradistinction to vibrating or moving down by the pressure of the car-wheel, and rising up when released from that pressure, as and for the purpose set forth.

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