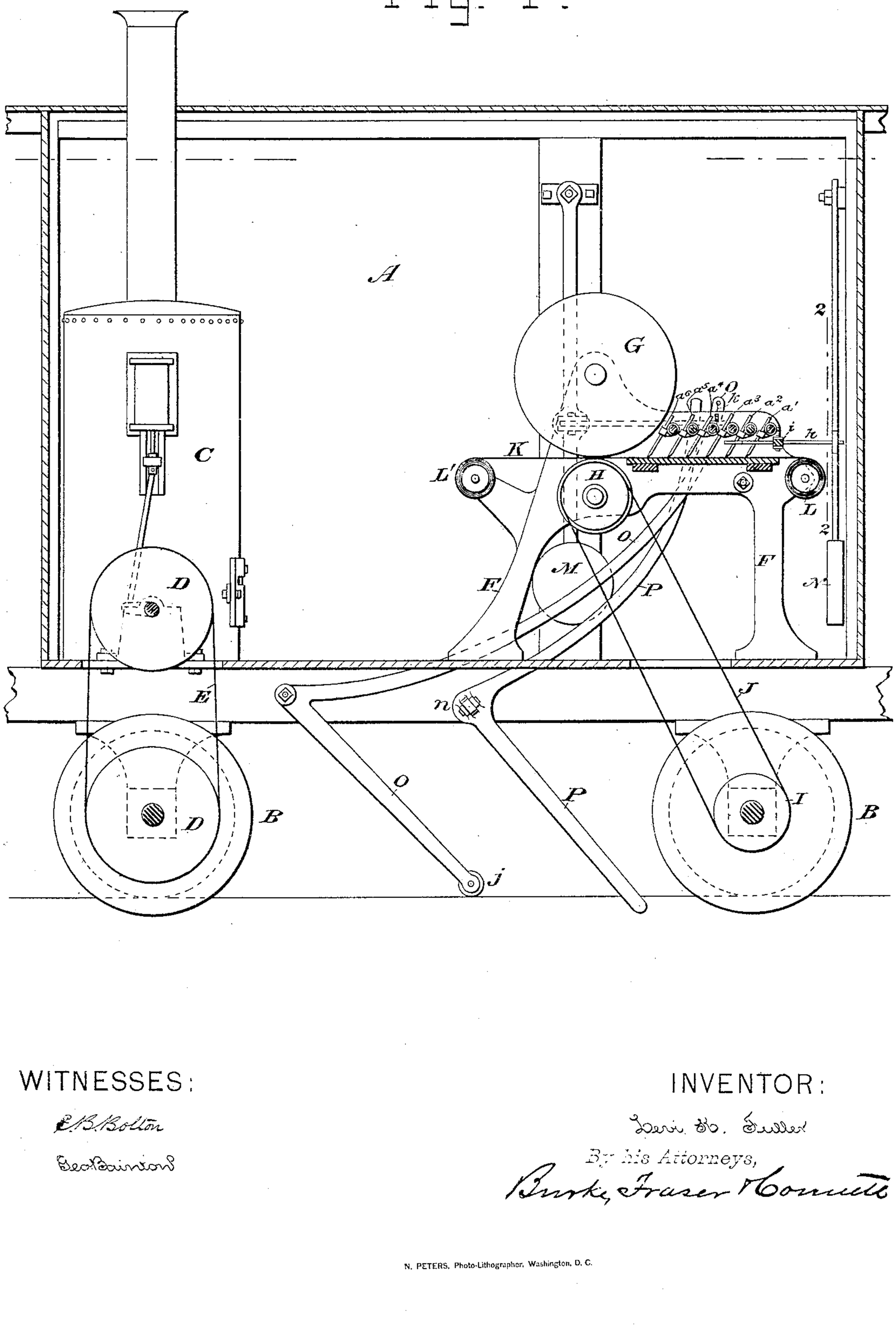
(No Model.) 3 Sheets—Sheet 1.

L. K. FULLER.

RAILWAY RECORDER.

No. 272,230. Patented Feb. 13, 1883.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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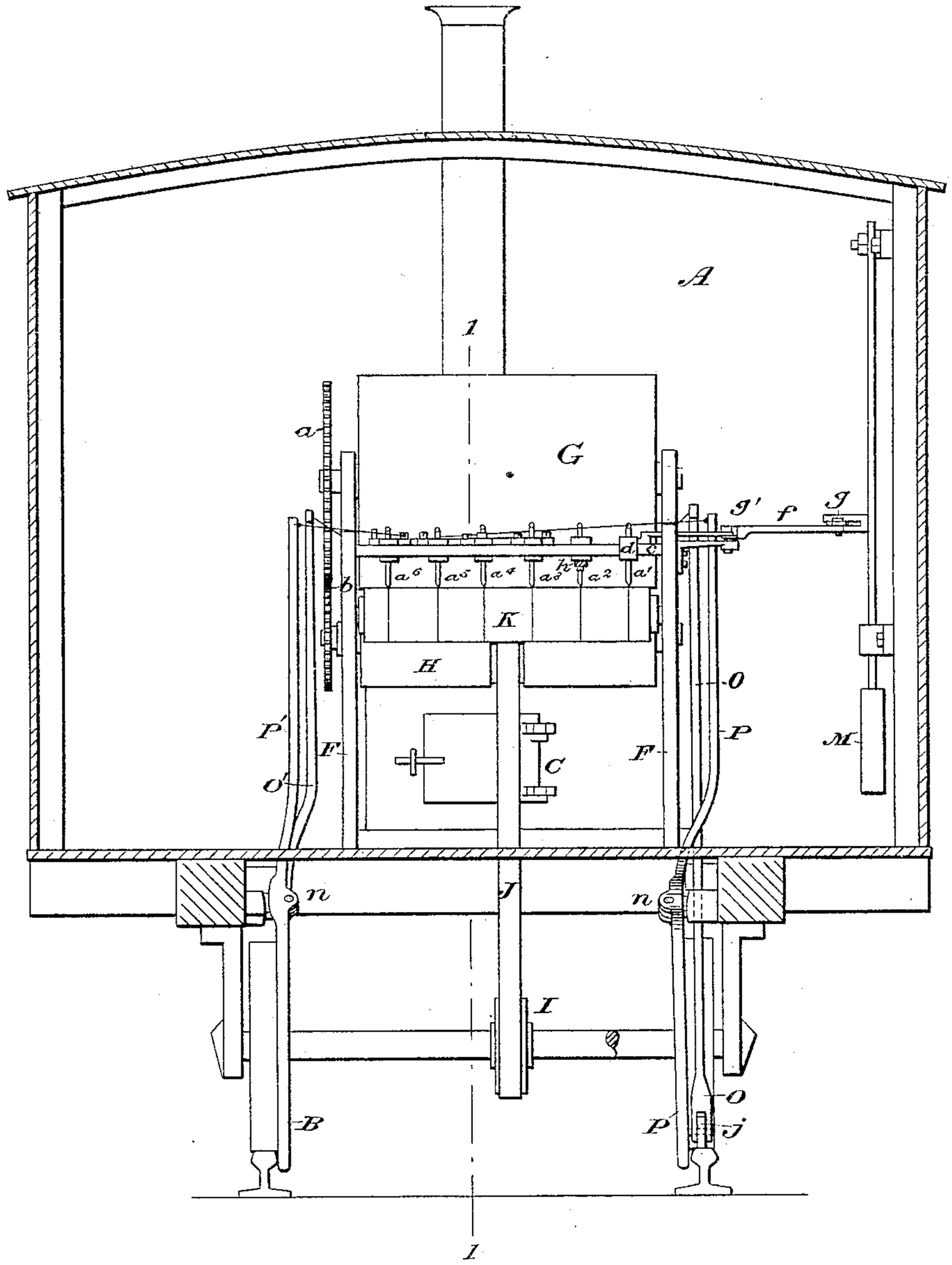
RAILWAY RECORDER.

No. 272,230. Patented Feb. 13, 1883.

Fig. 2.



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(No Model.)

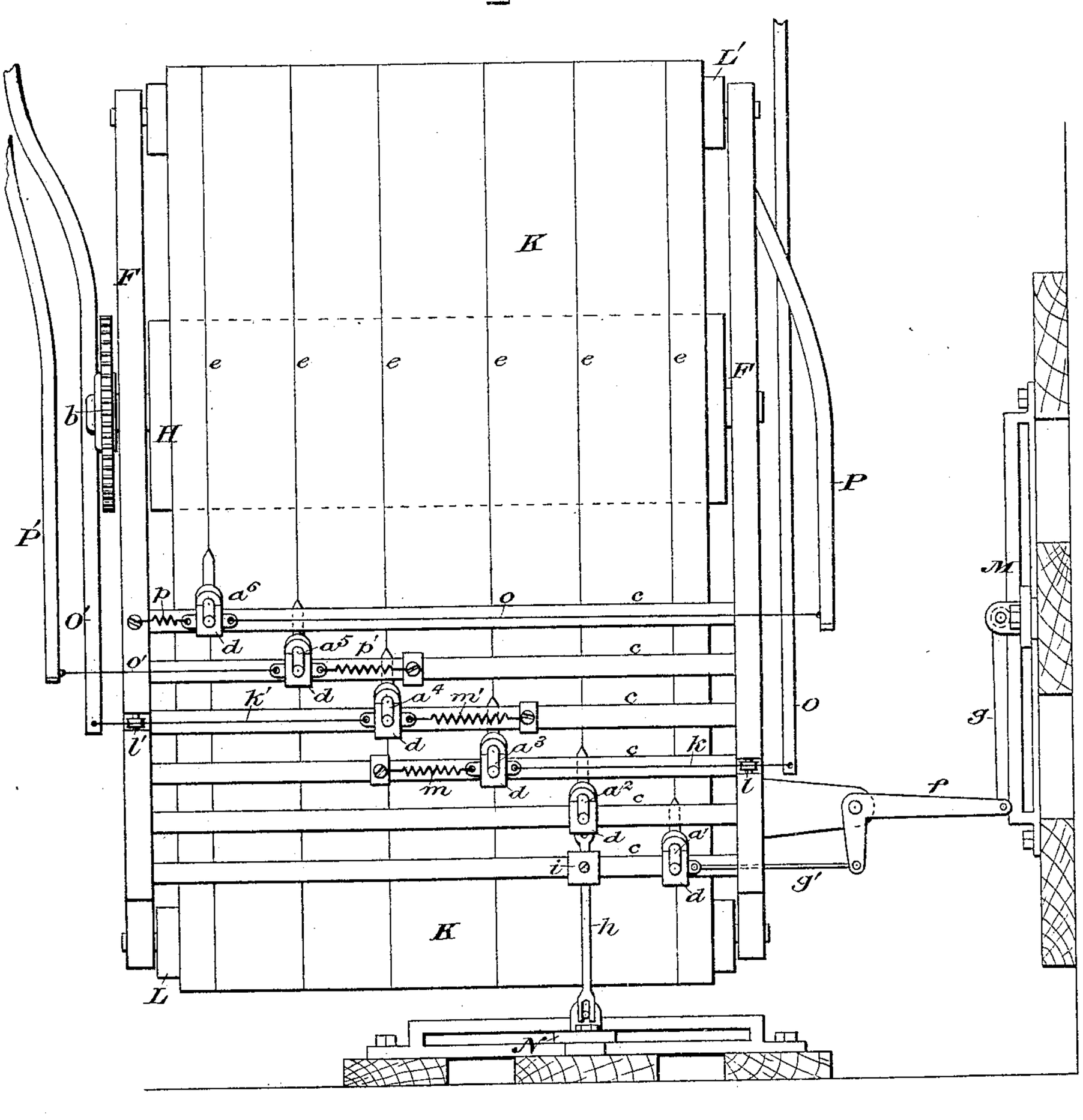
3 Sheets—Sheet 3.

L. K. FULLER.

RAILWAY RECORDER.

No. 272,230. Patented Feb. 13, 1883.

Fig. 3.



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UNITED STATES PATENT OFFICE.

LEVI K. FULLER, OF BRATTLEBOROUGH, VERMONT.

RAILWAY-RECORDER.

SPECIFICATION forming part of Letters Patent No. 272,230, dated February 13, 1883.

Application filed May 5, 1882. (No model.)

To all whom it may concern:

Be it known that I, LEVI K. FULLER, a citizen of the United States, residing at Brattleborough, Windham county, Vermont, have invented certain Improvements in Railway-Recorders, of which the following is a specification.

My invention relates to an instrument or apparatus for recording the condition of railway-tracks; and it consists of mechanism mounted on a vehicle or car to move over the track, which mechanism is adapted and arranged to record the comparative elevations of the two track-rails, the grade of the track with its elevations and depressions, the spread or tram of the rails, and other features and imperfections relating thereto. The vehicle or car bearing the recording mechanism may be constructed with one or more sets of trucks, and may be driven by a small engine coupled to one pair of the wheels. The recording mechanism is mounted on this car or "dummy."

In the drawings which serve to illustrate my invention, Figure 1 is a sectional side elevation of the car and the mechanism mounted thereon, the section being taken on line 1 1 in Fig. 2. Fig. 2 is a sectional elevation on line 2 2 in Fig. 1, the mechanism being in elevation. Fig. 3 is a plan of the mechanism, drawn to a scale double that of Figs. 1 and 2.

The general character of the invention may be set forth as follows: The apparatus records, first, the general grade of the track, showing the rise and fall above and below datum or some starting-point; second, the lateral or transverse grade of the track as exhibited in cross-section; third, the vertical inequalities and irregularities of both the rails—that is to say, their lack of parallelism; fourth, the variation in the gage of any of the rails, in order to ascertain if they are trammed correctly. Other irregularities of the same character may also be recorded on the same principle. A strip or roll of paper ruled with a series of longitudinal parallel lines at proper distances apart is provided, and this is fed along at a regulated speed by suitable mechanism driven from the car wheel or axle. The longitudinal scale of the graphic record being agreed upon, it is an easy matter to arrange the paper to move at the desired speed as the car advances. Pens, pencils, or other marking-instruments are mounted over and rest upon the moving paper, and these have a transverse movement or play by which they are made to follow the ruled lines on the paper, or to move to the right and left of them, so as to produce irregular lines as the paper moves along. The pen which is designed to record the grade of the track is actuated and controlled in its movements by a pendulum suspended in the car and arranged to swing forward and back, or in a plane parallel with the axis of the roadway. The pen which records the lateral grade of the track is actuated and controlled by a pendulum which swings transversely or at right angles to the axis of the track. The two pens which record the vertical irregularities of the two rails are actuated and controlled by two levers bearing wheels or rollers in their ends which rest upon the tracks. The two pens which record the gage of the track are actuated and controlled by two levers which bear against the insides of the rails. The several pendulums and levers are connected with and operate the pens through any suitable intermediate mechanism. This mechanism is so constructed as to record the inequalities and irregularities at any scale required, which may be called the "vertical" or "transverse" scale.

Referring to the drawings, A is the body of a car or vehicle, mounted suitably on wheels B B.

C is an engine and boiler of any kind, which furnishes the motive power, and this engine propels the car through the medium of pulleys D D and a belt, E, or toothed or friction gears may be employed, if preferred. Any known means may be employed for connecting the engine with the car-axle, and any power may be substituted for the steam-engine.

F is a suitable strong frame to support the recording mechanism, which frame is secured firmly to the car body or floor.

G is an upper feed-roll for the paper which receives the record, and H is the lower feed-roll. These are geared together by toothed wheels *a* and *b*, and the lower roll is driven from a pulley, I, on a car-axle through a belt, J.

K is the paper upon which the record is to

be made, which passes betwen rolls G and H, unwinding from a roll, L, and onto a roll, L′. The roll G may be arranged to bear with its weight upon the paper and roll H, and it may be provided with a roughened or anti-frictional surface, the better to prevent slipping, or both feed-rolls may be so provided.

Across the frame F are mounted a number of bearing or slide bars, *c c*—in this case six—to receive and support the holders *d d* of six pencils or pens, a' a^2 a^2 a^4 a^5 a^6. These pencils are arranged to rest with their points on the paper K, which moves under them, and to coincide normally with the six lines *e e*, which I call "standard lines," previously ruled or printed on the paper. These lines may, however, be printed or ruled as the paper moves along.

M is a pendulum mounted to swing in a plane parallel with the axis of the roadway or track, and it may be mounted on the side of the car, as shown. This pendulum is connected with and moves the holder of the pencil a' along its bar *e*. This may be done by any intermediate mechanism. That shown consists of a bell-crank lever, *f*, and rods *g* and *g′*, arranged to connect the arms of said lever with the pendulum and the pen-holder, respectively, as shown. By properly adjusting the length of the arms of the bell-crank lever, for example, the pen a' may be made to record the elevations and depressions of grade with accuracy and to any required scale. The elevations with this arrangement would be recorded to the left of the standard line *e* and the depressions to the right of the same.

N is a pendulum mounted to swing transversely or at right angles to the axis of the road. This pendulum actuates pen a^2 through suitable mechanism. As shown, a lever, *h*, with forks or slots in its ends, is pivoted at *i*, and the slots or forks in its ends take over pens on the pendulum N and holder of pen a^2, as best shown at Fig. 3. When the pen moves to the right of the standard line *e* it records an elevation of the right-hand side of the track.

O O′ are bent levers pivoted on horizontal axes to the car-body, their lower ends bearing rollers *j*, which rest on the track-rails. The upper ends of these levers rise and fall with the vertical inequalities of the rails, and their upper ends are connected with the holders of pens a^3 and a^4, respectively. As both levers operate their respective pens in the same manner, I will only describe the mechanism for actuating pen a^3. A cord or wire, *k*, extends from the end of lever O to the holder of pen a^3. When the lever rises the holder is moved laterally by means of the cord *k*, which passes under a sheave, *l*, on the frame, and when it falls the holder is moved back by a light retracting-spring, *m*.

P P′ are levers mounted on the car-body at *m*, as shown in Figs. 1 and 2. The lower ends of these levers bear against the insides of the track-rails and move in and out with the variations in the gage or tram of the said rails, as will be well understood. The upper ends of these levers are connected by cords or wires *o o′* with the holders of pens a^5 and a^6 precisely as in the case of pens a^3 and a^4. Springs *p p′* serve to retract the holders. Other means may be employed for communicating the motions of the levers O O′ P P′ with their respective pens—as, for example, rods and bell-cranks, as in the case of the pendulums M and N; but the mechanism shown is simple and convenient.

In Fig. 3 I have shown all of the pens arranged coincident with the standard lines, as in starting, or as in a case where the track is perfectly level and free from irregularities. The pens may be held down to the paper by gravity or by springs, as desired. Pencils of different colors, or ink of different colors, are employed for recording, in order that the record may be read and studied with greater ease than if all were of the same color. The standard lines serve as a base to measure from in estimating the transverse irregularities; and, as before stated, these may be ruled beforehand or as the record is made. In some cases the latter mode would be preferable, as the position of the lines would be governed solely by the adjustment of the ruling-pens, and the paper might be mounted with less care. If the line were ruled before the paper was mounted it would be necessary to adjust it very accurately, in order to bring the lines into their proper positions relatively to the recording-pens.

The car may be drawn instead of propelled, as shown, and the lower ends of levers O O′ may be arranged to rest on the rails behind or in front of the car, or as shown.

The paper may be arranged to move parallel to the roadway, or at any angle thereto, and the rods *c* need not be arranged at right angles to the standard lines *e;* but this arrangement is preferable.

I am aware that pendulums have been employed to actuate marking-instruments for recording grades, &c., on traveling strips of paper, and I make no broad claim to these for this purpose.

Having thus described my invention, I claim—

1. The combination, with the car and the strip of paper bearing the standard lines and arranged to be fed along by the movement of the car, of a lever pivoted to the car-body, and its lower end arranged to touch the track-rail, and its upper end connected with and arranged to move a pencil or other marking-instrument arranged to move across the moving paper, and the said pencil, all constructed and arranged to operate substantially as set forth.

2. In a railway-recorder, the combination, with the car, of the paper strip having standard lines marked thereon, the mechanism, constructed substantially as described, for feeding said strip along, the levers P and P′, pivoted to the car and arranged to bear against the

inner faces of the track-rails, the pencils a^5 and a^6, connected with said levers and mounted on guide-rods arranged transversely over the paper, and the springs p and p', all arranged to operate substantially as set forth.

3. In a railway-recorder for simultaneously recording the lateral and vertical irregularities of the track-rails, the combination, with the car, of the ruled paper K, and the mechanism for moving said paper, constructed and arranged substantially as shown, the levers P P′ and O O′, pivoted to the car-body, as shown, the marking-instruments a^5 and a^6, connected with levers P′ and P respectively and mounted to move in rods arranged transversely over the paper, the pens or pencils a^3 and a^4, connected respectively with levers O and O′ and mounted the same as pens a^5 and a^6, and the springs arranged to move the said pens in one direction, said levers being arranged to contact with the track-rails, all substantially as and for the purposes set forth.

4. The combination, in a railway-recorder, of a car provided with mechanism, substantially as described, driven from the axle of the car, to move the paper that is to receive the record, the said paper K, provided with standard lines e, arranged to be fed along in a direction parallel to said lines, a marking-instrument mounted on a bar arranged transversely over the paper, and said pen arranged to stand coincident with one of the standard lines on the paper at points in the road where there are no irregularities in the track-rails, and means, substantially as described, arranged to move the said marking-instrument transversely across the paper on one side or the other of the standard line, according to the irregularity of the track-rail when such irregularity is encountered, all arranged substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LEVI K. FULLER.

Witnesses:
W. H. CHILDS,
J. E. HALL.