

No. 610,848.

Patented Sept. 13, 1898.

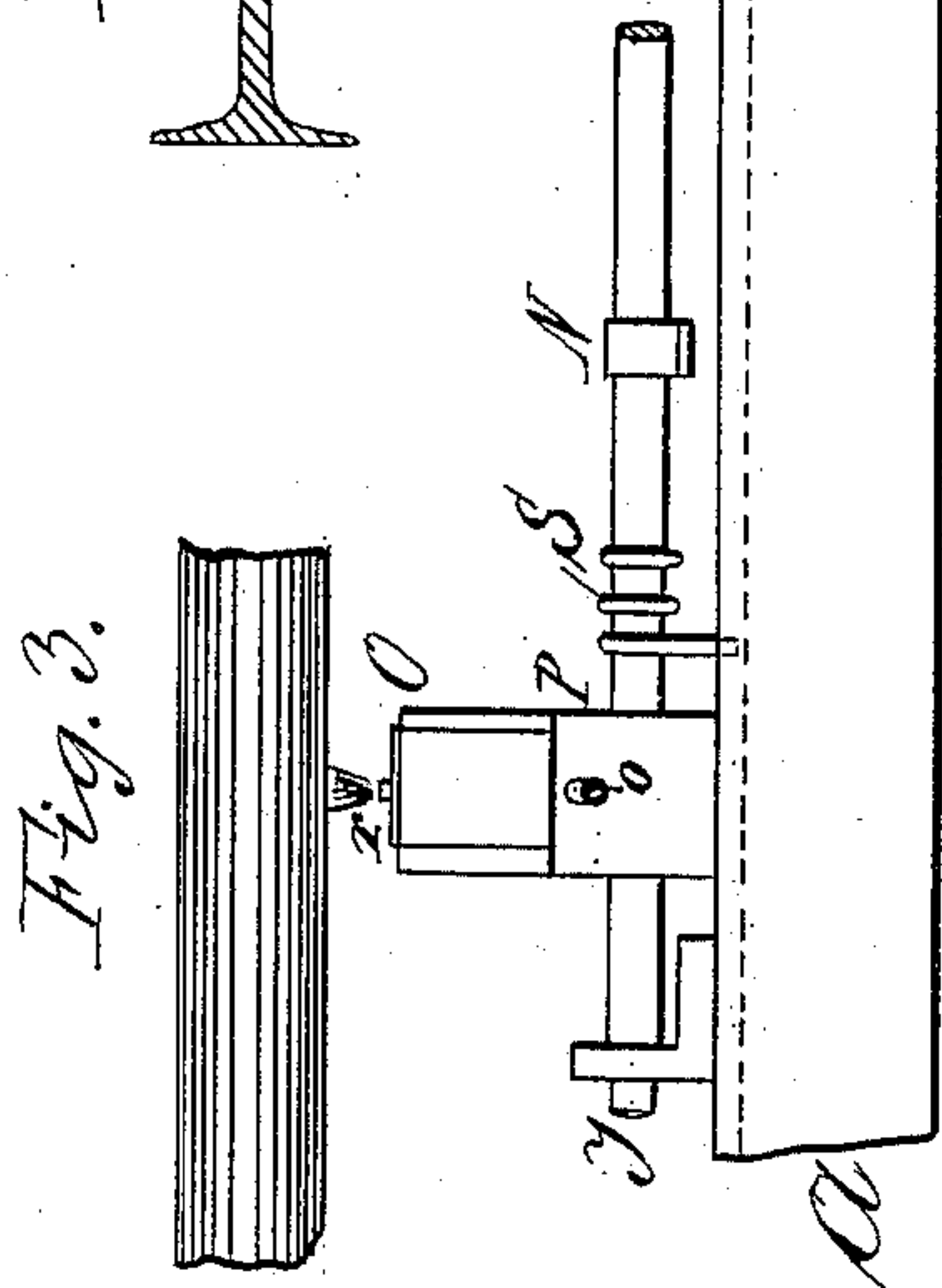
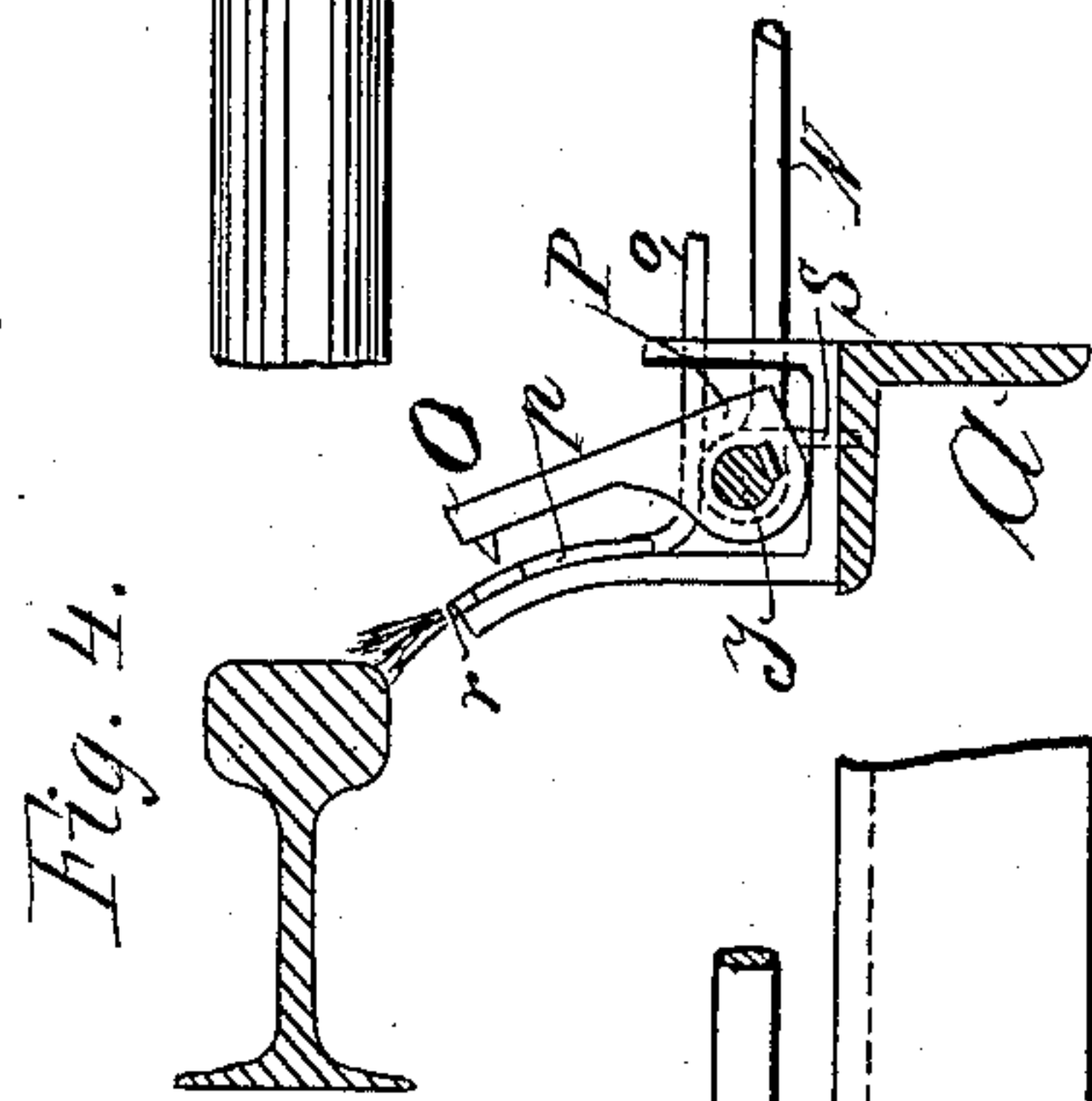
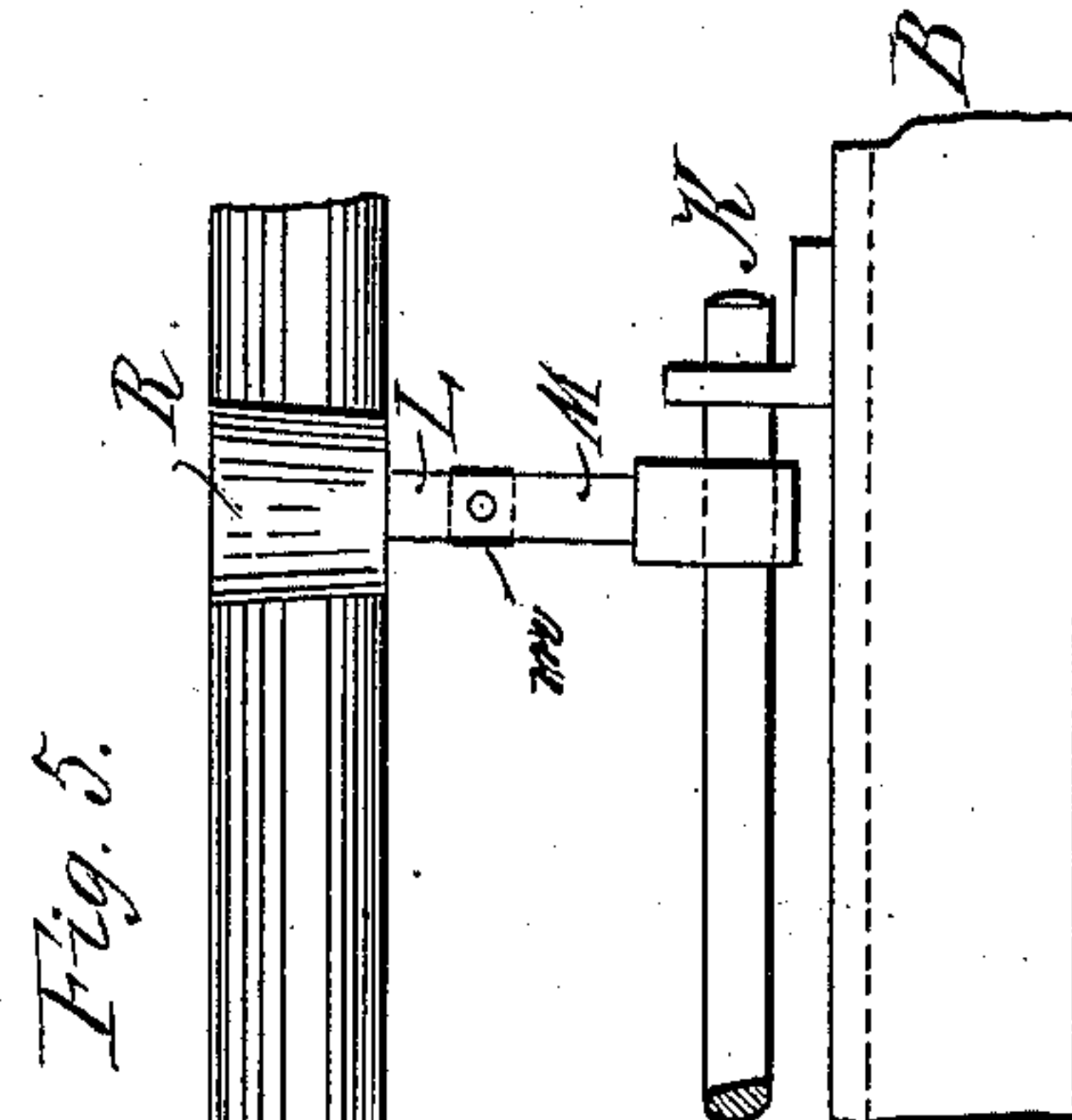
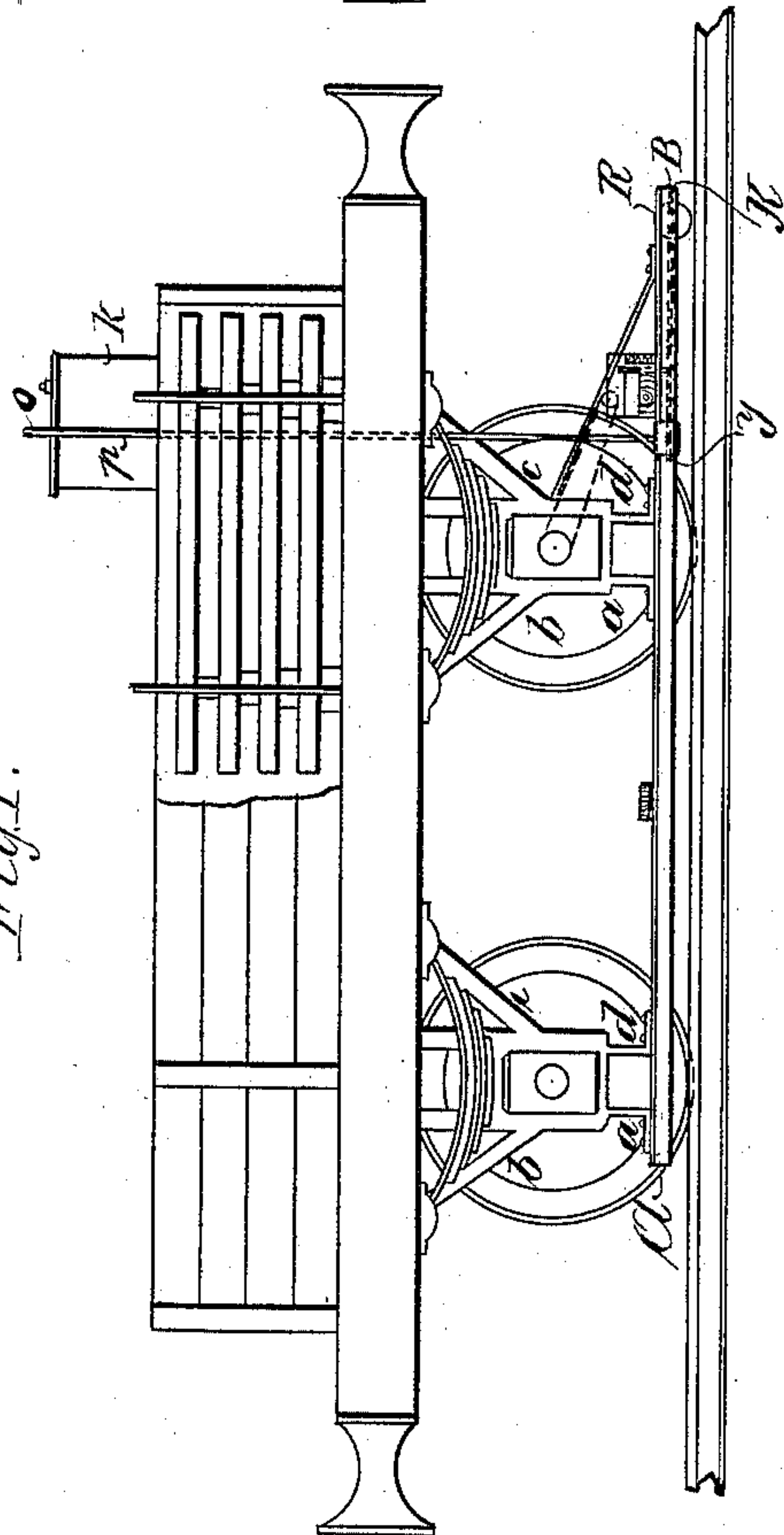
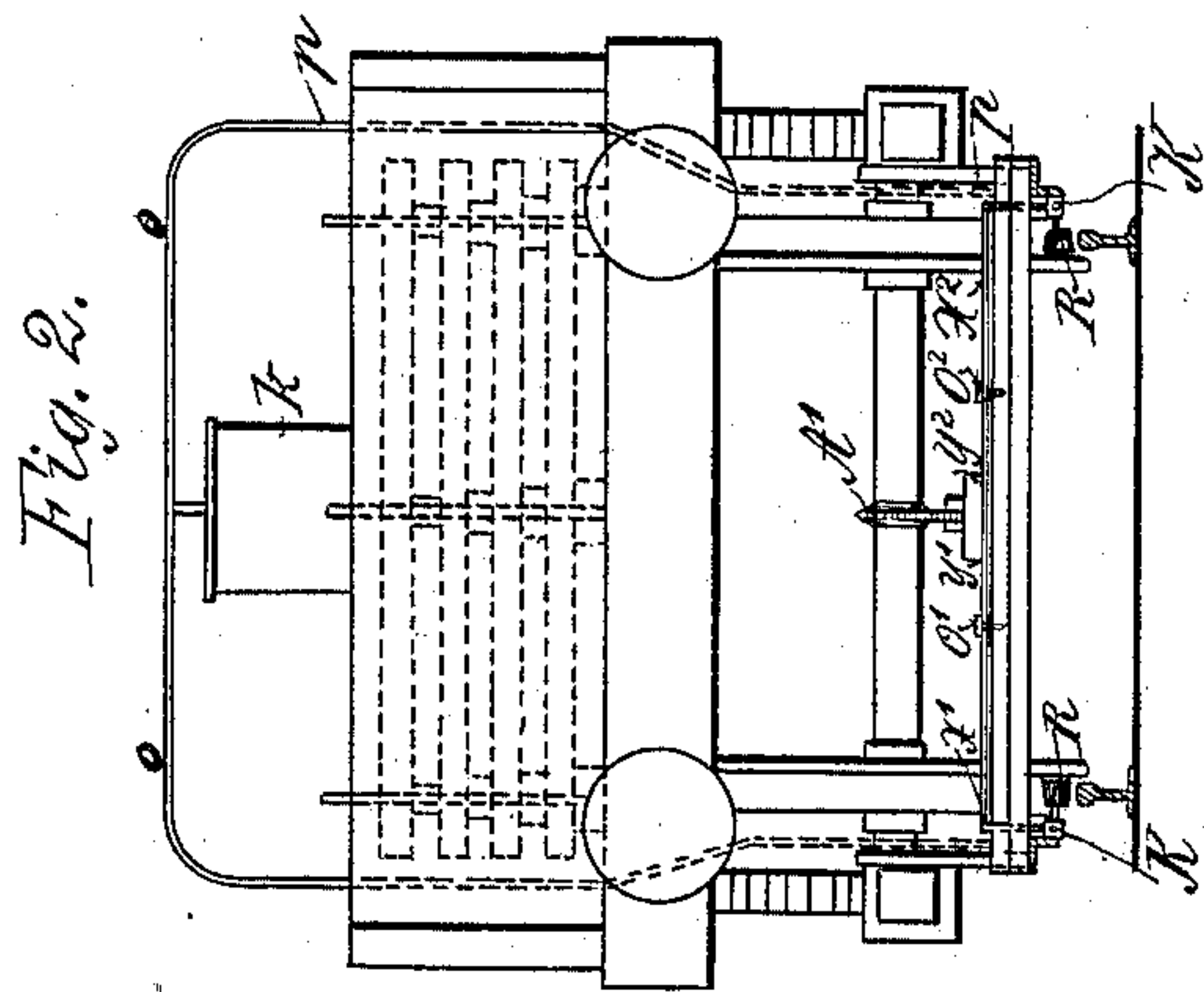
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APPARATUS FOR AUTOMATICALLY RECORDING UNEVENNESS IN RAILWAY TRACKS.

(Application filed Nov. 19, 1897.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:  
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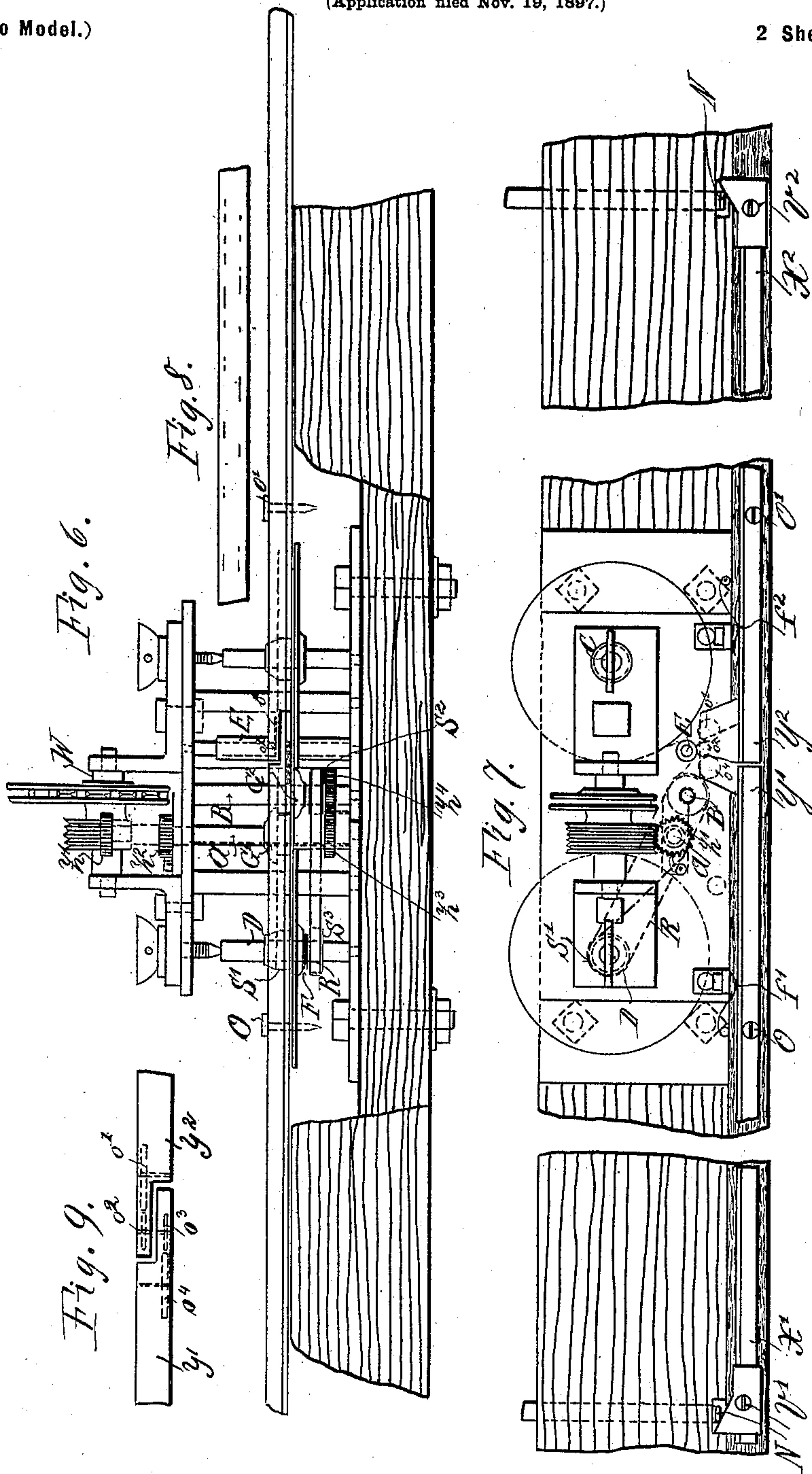
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# UNITED STATES PATENT OFFICE.

JOSEPH LIVTSCHAK, OF WILNA, RUSSIA.

APPARATUS FOR AUTOMATICALLY RECORDING UNEVENNESS IN RAILWAY-TRACKS.

SPECIFICATION forming part of Letters Patent No. 610,848, dated September 13, 1898.

Application filed November 19, 1897. Serial No. 659,190. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH LIVTSCHAK, engineer, a subject of the Emperor of Russia, and a resident of Wilna, Russia, have invented certain new and useful Improvements in Apparatus for Automatically Recording Unevenness in Railway-Tracks, of which the following is a specification.

The object of the present invention is a device for automatically marking the defects in a railway-track by means of which both workmen and traffic officials are enabled to determine irregularities in the level and the officials placed in a position to control the work.

The new device consists in the combination of a marking apparatus and a recording apparatus on a railway-truck arranged in such manner that the jolting occasioned by passing over defective places on the line causes a jet of colored fluid to indicate such spots and, further, causes such indications, traced on a definite scale, to be received upon the strip of paper of a recording apparatus. The truck constructed for this purpose must have two axles with as short an intervening space as possible. The carriage should be so loaded that there is a minimum of weight on the front axle and a maximum on the rear axle, the construction being such that the pressure on the latter remains constant also when in rapid motion. This is best attained by arranging a number of heavy plates with elastic layers superimposed between them.

The accompanying drawings show the invention.

Figures 1 to 5 illustrate the arrangement of the marking apparatus. Fig. 1 is a front view of the arrangement on a railway-truck; Fig. 2, an end view of same; Fig. 3, a detail part plan view of the marking apparatus to a larger scale; Fig. 4, a side view, partly in section, of same; Fig. 5, a part plan view supplementary to Fig. 3. Figs. 6 to 9 show the arrangement of the recording apparatus, Fig. 6 being a side view, and Fig. 7 a plan view, of same. Fig. 8 shows a piece of the paper strip or portion of a record, and Fig. 9 the arrangement of the color-rollers.

The marking apparatus consists of two angle-iron rails A B, hung each from two axle-boxes, which rails are secured to the axles by framing *a b c d* and joined together to

form a rigid frame at a certain distance above the track by means of cross-bars. Inside and close to the rails A B, running from B to the point G, axes J K are mounted in brackets, as shown in Figs. 3 to 5. Each of these axes carries three fixed arms L M, N, and O P, of which L M and O P are mounted in approximately horizontal position, while the arm N runs vertically upward. The horizontal arm L M carries at its end a conical roller R, rotating upon a ball-bearing. The position of the roller R above the rails is shown in Figs. 2 and 5. A conical form is selected on account of the conical form of the trailing wheels, so that on passing round curves the distance from the surface of the rail-head may not be altered even when the truck sways to and fro. The arm O P, Figs. 3 and 4, is for the purpose of regulating the flow of the colored liquid from the reservoir *k*, where it is contained under certain pressure, through the rubber piping *o p* and nozzle *r*. The regulation is effected by means of the short arm O P, a tooth at the end of which, under action of the spiral spring S, which causes a partial rotation of the axes J K when the rollers R are in contact with the axes, presses the end of the rubber pipe, thus preventing flow of the fluid. The arm N has the sole purpose of transmitting the oscillations of the axes J K to the recording apparatus.

The operation of the marking apparatus is as follows: The apparatus is adjusted upon a thoroughly rigid horizontal track, so that the rollers R R are about two to five millimeters from the rails, which can be effected by inserting thin metal plates *m* in the separable arm L M, near its connection to axis K, as shown in Fig. 5. The truck, with the load directly over the rear axle, is then hitched on as the last truck on to a train. In passing over the track where the rails under the load are equally depressed the rollers R R remain out of operation and there is no flow of coloring fluid. If, however, the rear wheels of the truck pass over a place where in consequence of bad bedding the track is defective, the part B of the rail A B sinks, together with the wheels, the rail A B thus taking up a position deviating from the horizontal. The small roller R thus comes in contact with the railway-track and causes partial rotation of the



axes J K, whereby the nozzle of the rubber pipe is opened and a flow of the coloring fluid takes place. It is obvious that the quantity of the fluid distributed will under constant pressure and uniform speed correspond to the degree of sinking at the place in question. The amount of color distributed may thus be taken as a measure of the sinking of the track.

Loading of the rear axle by means of heavy plates and intermediate elastic layers is only necessary where there is great speed, such as in the case of express-trains.

The recording apparatus, which receives the indications for both rails upon one continuous strip of paper, is shown in Figs. 6 to 9. Fig. 8 shows a piece of such a strip of paper in full size. On the same will be observed two rows of longitudinal lines of unequal thickness and at varying distances apart. These strokes indicate the unevenness in the railway-track as recorded by the marking apparatus. One row of lines shows to a definite scale the unevenness on one rail, the second row those on the other rail. The degree of unevenness at any spot is shown by the length of the corresponding stroke. The record shown is effected by the paper strip, proportioned to the distance to be traveled during running of the train, being led over two ink-rollers, as shown in Fig. 9, which from time to time come in contact with the strip.

The operating mechanism is shown in Figs. 6 and 7 in side and plan views, respectively. The axis A carries three toothed wheels  $Z'$ ,  $Z^2$ , and  $Z^3$ , of which  $Z'$  and  $Z^3$  are spur-wheels and  $Z^2$  a ratchet-wheel. A wheel  $Z^4$  on the axis B engages with the wheel  $Z^3$ . The axes A and B are, in addition, provided with rubber rolls  $G'$  and  $G^2$ , which through their rotation draw the strip of paper between them, and thus unwind from the paper-roll on the axis C. The axis D, with reel  $S'$ , receives the paper strip again, the axes B and D having belt-pulleys  $S^2$   $S^3$  at their lower ends, the former being keyed to its axis, while the latter is mounted loosely upon its axis and transmits its movement of rotation, received from the band R by means of the friction of the spiral spring F, to the paper-roll mounted on said axis in such degree as the paper strip being wound on admits. There is, further, an axis E, covered with rubber, over which the paper strip is guided. All the axes are set in operation for winding or unwinding, respectively, as soon as the axis A is rotated. The latter receives its motion by means of a chain-wheel  $A'$ , Fig. 2, on the axle of the truck, which transmits its motion to the axis W of the registering apparatus, Figs. 6 and 7, by means of a Gall's chain, the motion being further transmitted by a worm-wheel U, engaging in the wheel  $Z'$ . Backward rotation is prevented by the ratchet-wheel and click  $Z^2$ .

The two recording-rollers are operated by means of a particular arrangement of levers, likewise as shown in Figs. 6 and 7. On the

framework of the recording apparatus are two levers  $X' Y'$  and  $X^2 Y^2$ , having their fulcras at O and O'. The ends  $Y'$  and  $Y^2$  of each lever have rectangular notches, Figs. 6 and 9, and fit into one another. On the overlapping ends are mounted the little rolls  $o'$ ,  $o^2$ ,  $o^3$ , and  $o^4$ , the rolls  $o'$  and  $o^4$  being ink-rolls, while  $o^2$  and  $o^3$  are contact-rolls for effecting the marking on the paper. The two rolls  $o^2$  and  $o^3$  lying one above the other, they are adapted to mark in the same vertical plane simultaneously, and thus record the depressions of each rail. The two levers receive motion through the oscillations of the lever-arm N, Figs. 3 to 5, the outer ends  $X'$   $X^2$  being provided with wedge-shaped blocks  $V' V^2$ , against which the said lever-arms N push, thus imparting motion. The adjustable blocks  $V' V^2$  are provided for the purpose of fixing exactly the position opposite to the lever-arms N. The levers  $X' Y'$   $X^2 Y^2$  are again brought back to their original position by means of springs  $f' f^2$ .

I claim—

1. In a device for automatically marking and recording depressions or other analogous defects in railway-lines, as described, the combination with a railway-truck having two axles, of spring-mounted conical rollers provided in suitable supports on both sides of said truck, bent levers fulcrumed in said supports, adapted to receive the vertical shocks thrown upon said rollers, due to defects on the line, a nozzle arrangement operated by said rollers through suitable intermediate means, said nozzle being in communication with a reservoir of a suitable colored fluid material, marking-levers  $X'$ ,  $Y'$ ,  $X^2$ ,  $Y^2$ , adapted to be operated by means of a lever N, marking-rolls operated by said levers and suitable means to obtain a uniform feed of a paper strip to the marking-rolls, at a rate corresponding to the speed of the train, whereby an accurate record of existing defects in the road is obtained, substantially as described.

2. In a device for automatically marking and recording depressions or other analogous defects in railway-lines as described, the combination with a railway-truck having two axles, of a series of heavy weights provided on said truck having elastic layers superimposed between them, said weights being disposed over the rear axle of the truck; the rails A B provided on either side of said truck, suitable supports on said rails, shafts journaled in said supports, separable arms movably secured on said shafts, and springs tensioning said arms; and conical rollers provided in ball-bearings on the outer ends of said arms, adapted to be engaged with the track-rails, bent levers fulcrumed in said supports, adapted to receive the vertical shocks thrown upon said rollers due to defects in the line; a nozzle arrangement adapted to be operated by said rollers through suitable intermediate means, said nozzle being in communication with a reservoir of a suitable



colored liquid material, marking-levers X', Y', X<sup>2</sup>, Y<sup>2</sup>, adapted to be operated by said bent levers; marking-rolls operated by said levers; and suitable means to obtain a uniform feed of a paper strip to the marking-rolls at a rate corresponding to the speed of the train, substantially as described and for the purpose specified.

3. In a device of the class described, the combination with a railway-truck, having two axles as described, of hangers depending from said axles and carrying rails on either side of said truck, suitable supports on said rails, shafts journaled in said supports, spring-actuated separable arms movably secured on said shafts and carrying at their outer ends conical rollers adapted to be engaged with the track-rails, bent levers N fulcrumed in said supports, adapted to receive the vertical shocks thrown upon said rollers; a nozzle arrangement mounted in said supports in op-

erative relation to and adapted to be controlled by said rollers through suitable intermediate means, said nozzle being in communication with a reservoir of a suitable colored liquid material; levers X', Y', X<sup>2</sup>, Y<sup>2</sup>, in operative relation with levers N; marking-rolls operated by said levers; and suitable mechanism for uniformly feeding a paper strip to said marking-rolls at a rate corresponding to the speed of the train, whereby an accurate and permanent record of existing defects in the road is obtained, substantially as and for the purpose specified.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

JOSEPH LIVTSCHAK.

Witnesses:

HENRY HASPER,  
WALDEMAR HAUPT.