(No Model.) 2 Sheets—Sheet 1.

O. LEUNER.

APPARATUS FOR INDICATING THE FLEXION OF BRIDGES, RAILS, &c.

No. 399,676. Patented Mar. 19, 1889.

Fig. 1.

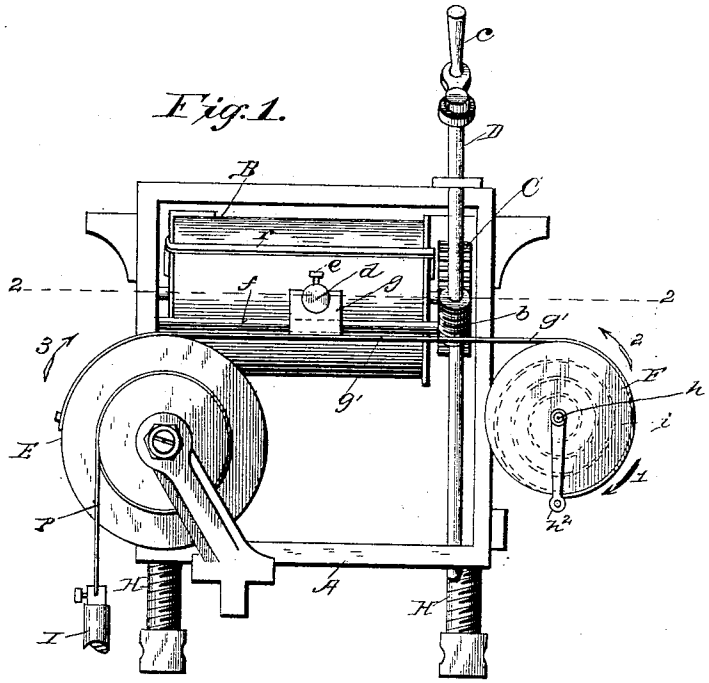


Fig. 2.

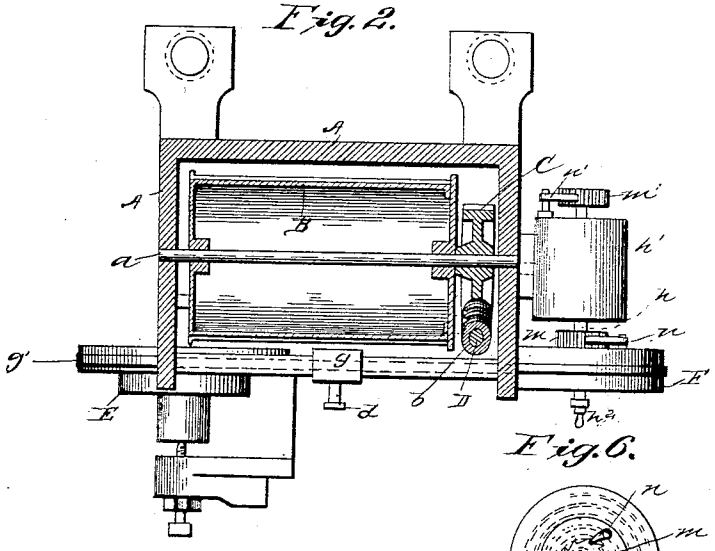
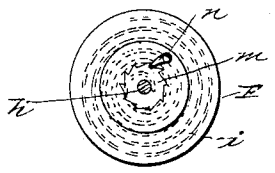


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

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APPARATUS FOR INDICATING THE FLEXION OF BRIDGES, RAILS, &c.

No. 399,676. Patented Mar. 19, 1889.

Fig. 3.

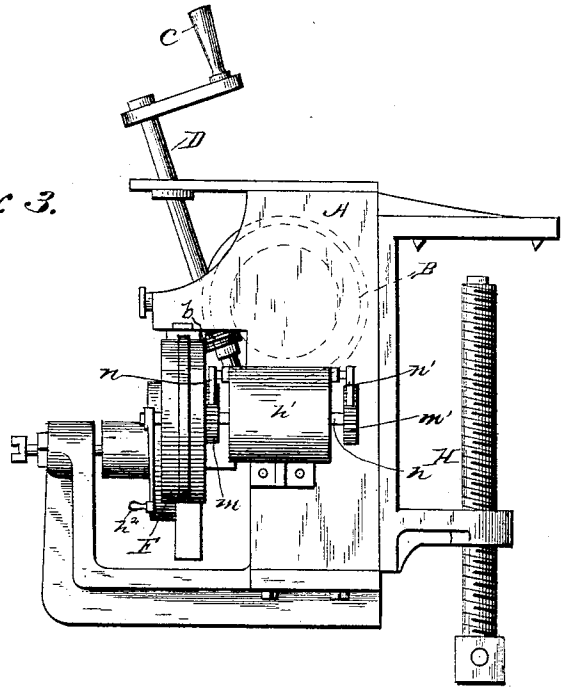


Fig. 4.

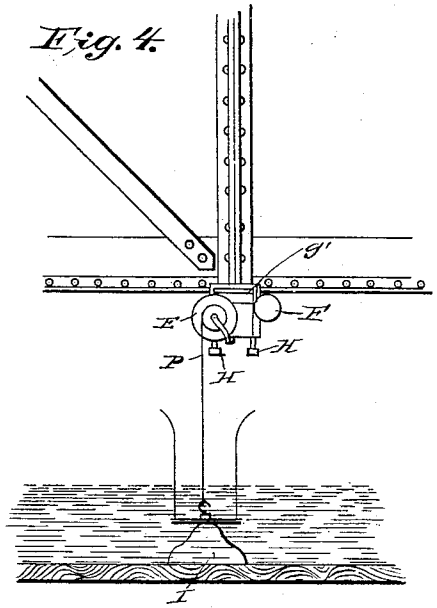
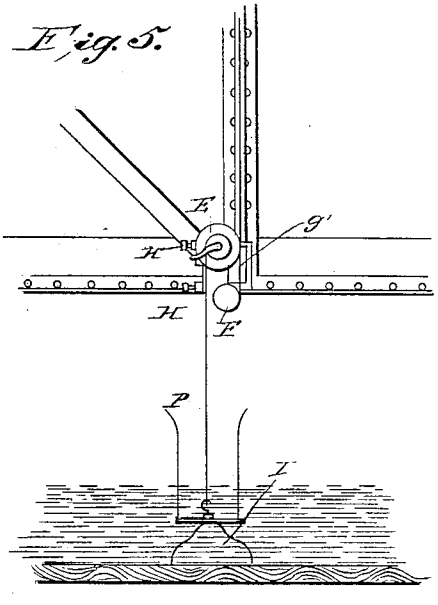


Fig. 5.



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UNITED STATES PATENT OFFICE.

OSCAR LEUNER, OF DRESDEN, SAXONY, GERMANY.

APPARATUS FOR INDICATING THE FLEXION OF BRIDGES, RAILS, &c.

SPECIFICATION forming part of Letters Patent No. 399,676, dated March 19, 1889.

Application filed January 26, 1887. Serial No. 225,559. (No model.) Patented in England October 28, 1886, No. 13,844; in Belgium November 15, 1886, No. 74,936; in Austria-Hungary March 7, 1887, No. 43,144 and No. 8,739, and in Germany May 7, 1887, No. 37,305.

To all whom it may concern:

Be it known that I, OSCAR LEUNER, manufacturer, of Dresden, in the Kingdom of Saxony and German Empire, have invented a new and useful Apparatus for Indicating the Flexions of Bridges, of which the following is a specification, reference being had therein to the accompanying drawings, no patents being obtained by me anywhere for this invention save in Austria-Hungary, No. 43,144/8,739, dated March 7, 1887; in Great Britain, No. 13,844, dated October 28, 1886; in Belgium, No. 74,936, dated November 15, 1886, and in Germany, No. 37,305, dated May 7, 1887.

This invention relates to deflectometers or apparatus for indicating the deflections of bridges, rails, &c.; and it consists in certain improvements in the construction of such apparatus, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents a front view of a deflectometer having my improvements. Fig. 2 is a horizontal section taken on line 2 2 of Fig. 1. Fig. 3 is a side view of the apparatus. Figs. 4 and 5 illustrate the operation of the device. Fig. 6 is a detail view of a spring-drum and connections.

A designates the main frame of the machine, in which the shaft *a* has its bearings, the indicator-drum B and worm-wheel C being carried by the said shaft, as shown. On a rotative shaft, D, which has bearings in the frame, is a worm, *b*, which engages with wheel C, and by means of shaft D, which is provided with a crank, *c*, the drum B may be rotated. A drawing-pencil, *d*, is secured by means of a screw, *e*, to the sliding head *g*, which is movable on a rod, *f*, which is fixed to the frame. The head *g* is fastened to a steel band, *g'*, one end of which is fastened to the largest section of a stepped pulley, E, which is mounted in the frame, and is held between two screws, being adjustable by means of said screws. The other end of the band *g'* is fastened to a rotative drum, F, on a shaft, *h*, which extends through a pillow-block, *h'*. Within the drum F is a spring, *i*, which is coiled about the shaft *h* and has one end secured thereto, the other end of the spring being fastened to the shell of the drum. The shaft *h* is provided with a crank, h^2, by which the spring *i* may be wound thereon, and said shaft is also provided with two ratchet-wheels, *m* and *m'*, with which two pawls, *n* and *n'*, respectively engage, the pawl *n* being connected with the drum F, and pawl *n'* being connected with the pillow-block, as shown. As seen in Fig. 2, the two pawls engage the ratchet-wheels from opposite directions, whereby the force of the spring *i* and the rotation of the shaft *h* in either direction may be controlled as desired. Thus, when the spring is wound up, by turning the crank h^2 in the direction indicated by the arrow 1, Fig. 1, the said spring tends to make the drum rotate in that direction, thus stretching the band *g'*, and such rotation may be prevented by putting the pawl *n* in connection with ratchet-wheel *m*. Any backward movement of the shaft *h* in the direction indicated by arrow 2, after the spring is wound, is prevented by pawl *n'* in connection with ratchet-wheel *m'*.

To the middle section of the stepped pulley E is secured a depending steel band, P, having a weight, I, attached to its lower end. From this construction it will be seen that the tension of the band *g'* is readily regulated.

A sheet of paper, on which a diagram of deflections is to be drawn, is extended on the drum B, and may be secured thereto by means of a clamping-rod, *r*. The apparatus may be applied to any part of a bridge to be tested by means of a clamp provided with binding-screws H.

In Figs. 4 and 5 the operation is illustrated, the device being shown as applied to a bridge. The device being secured in place by means of the binding-screws H, the weight I is let down to the ground or to the bottom of the stream, the pulley E being rotated, so that the band *g'* is tightly drawn. The sheet on which a diagram of deflection is to be drawn is secured to the indicator-drum B, and the sliding head *g*, which carries the pencil, is moved to the pulley E on the left, so that there will be sufficient surface for drawing a

diagram of the deflection as it moves to the right. The crank h^2 is then turned in the direction of the arrow 1, the pawl n being raised from the wheel m, and the pawl n' being put in connection with the wheel m', so that the band g is drawn until the resistance of the weight I, just touching the ground, and the tension of the spring i in the drum F are balanced. The part to be tested is then weighted sufficiently for the purpose, and, yielding more or less to the gravity of the weight placed upon it, the distance between such part and the ground or the bottom of the stream is somewhat reduced, so that the weight I rests on the ground, and the band g' is relaxed or loses its tension. In consequence of this the spring i rotates the drum F, thus drawing the band g' and turning the pulley E in the direction of the arrow 3. The pulley E continues to rotate until the gravity of the weight I again balances with the tension of spring i in the drum F. The head g, which carries the pencil, is moved according to the deflection toward drum F. The drum B is meantime rotated by means of crank c through worm-gearing b and C, and a diagram indicating the deflection is drawn by the pencil on the sheet carried by the drum B, from which diagram the degree of such deflection may be calculated.

I claim—

1. In an apparatus for indicating deflections, the combination, with an indicator-drum on a rotative shaft, of a rotative spring-drum, a pulley provided with a pendent weight, a band connected with said spring-drum and pulley, and a head provided with a marking-pencil and secured to the said band, substantially as and for the purposes described.

2. The combination, with an indicator-drum on a rotative shaft, of a spring-drum on a shaft provided with ratchet-wheels, pawls engaging with said ratchet-wheels, a stepped pulley and a weight connected therewith, a band which is connected with said pulley and with said spring-drum, a sliding head secured to said band, and a rod, f, on which said head moves, said band rotating the indicator-drum, substantially as and for the purposes described.

3. The combination, with the rotative indicator-drum, of two rotative cylindrical devices, a band connected with said devices and carried near said drum, a fixed rod, and a movable head provided with a pencil, the said movable head being mounted on said rod and secured to the said band, substantially as and for the purposes described.

4. The combination, with the shaft a, an indicator-drum on said shaft, the shaft D, and the worm b on said shaft, of a fixed rod, f, a movable head provided with a pencil and mounted on said rod, a band, g', which is secured to said movable head, and mechanism, substantially as described, for drawing said band in either of two opposite directions, substantially as and for the purposes described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

OSCAR LEUNER.

Witnesses:
ADOLF REÜTEN,
OTTO PEBZ.