(No Model.)

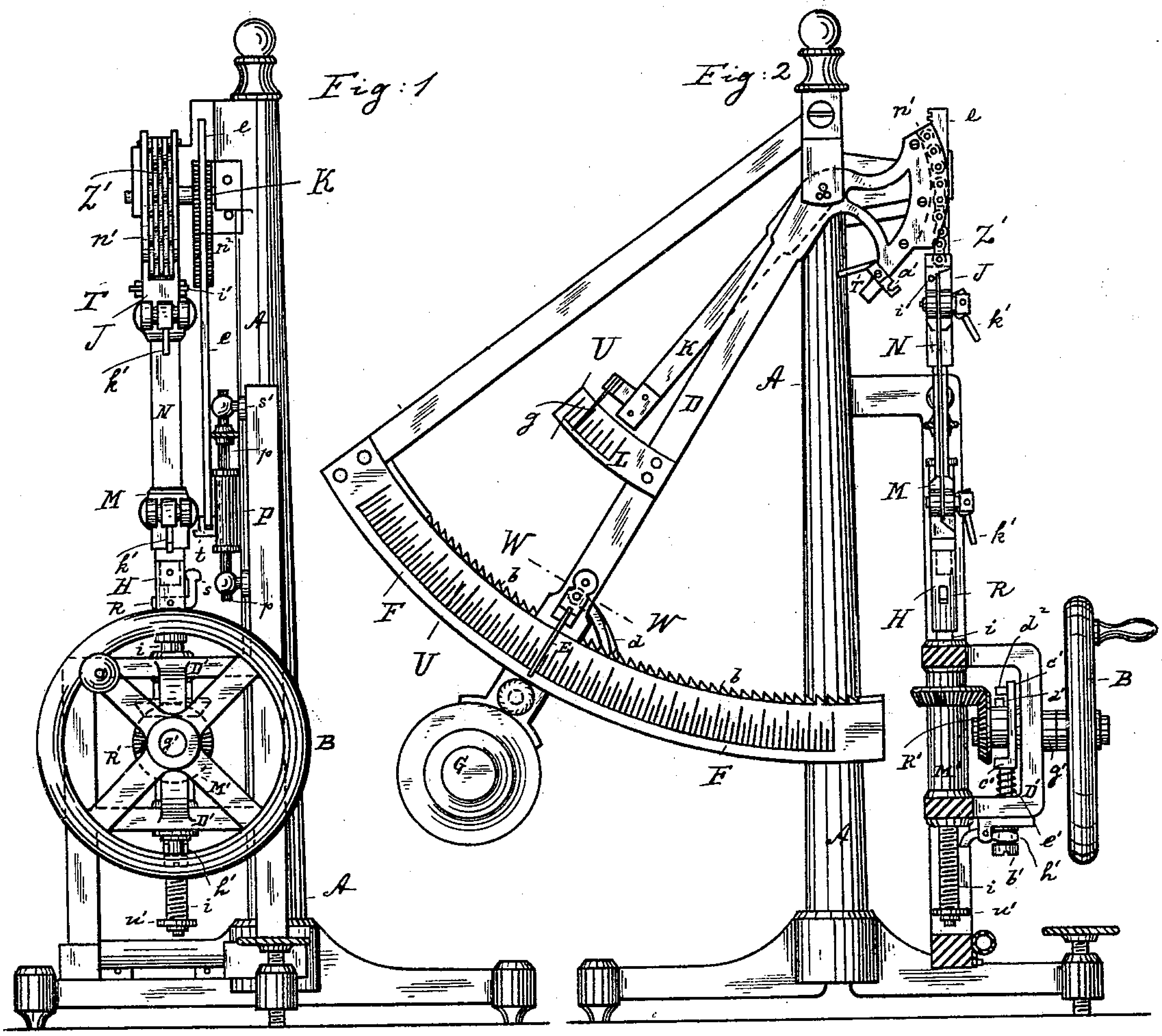
3 Sheets—Sheet 1.

L. SCHOPPER.

TESTING MACHINE.

No. 521,323.

Patented June 12, 1894.



Witnesses:
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THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

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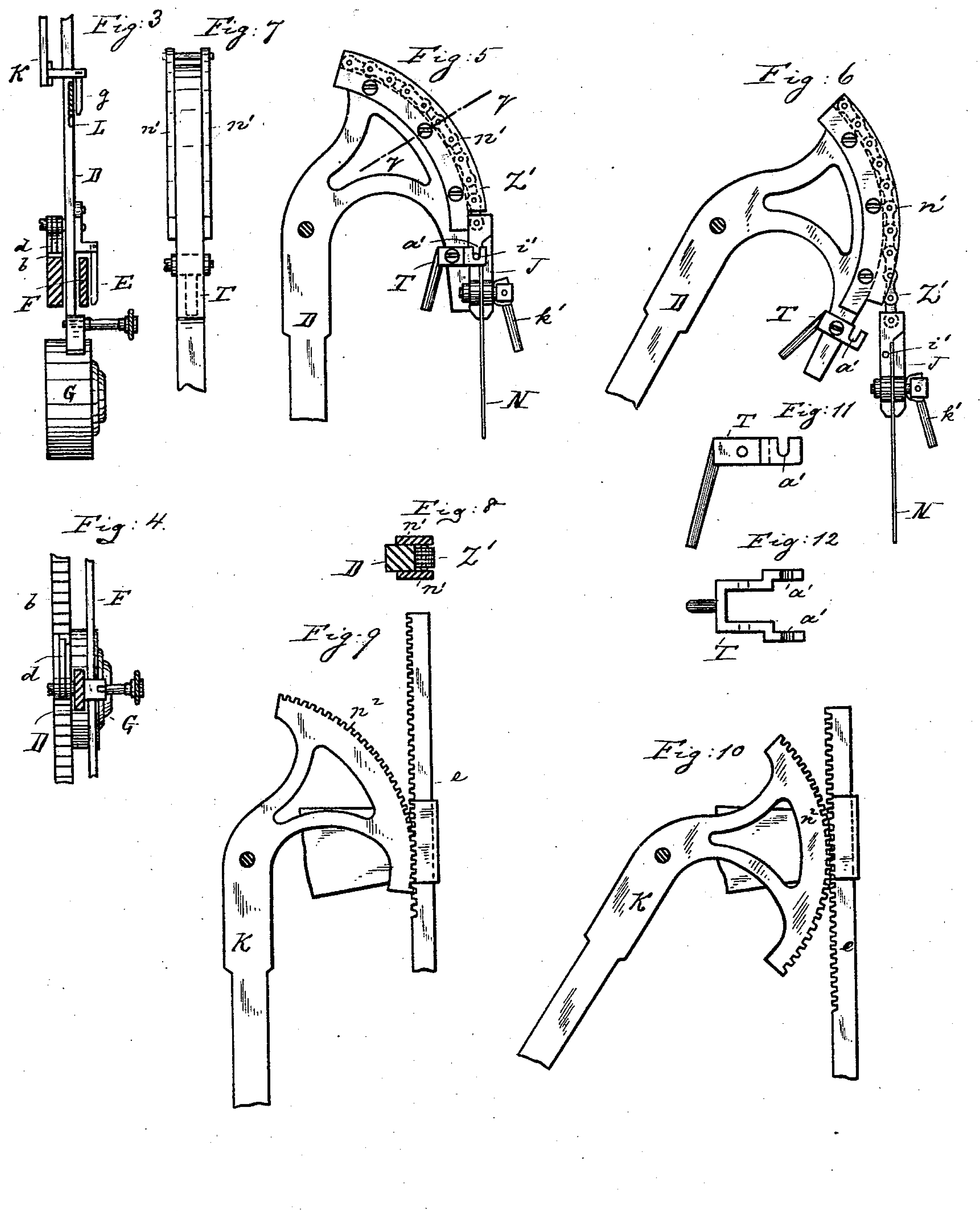

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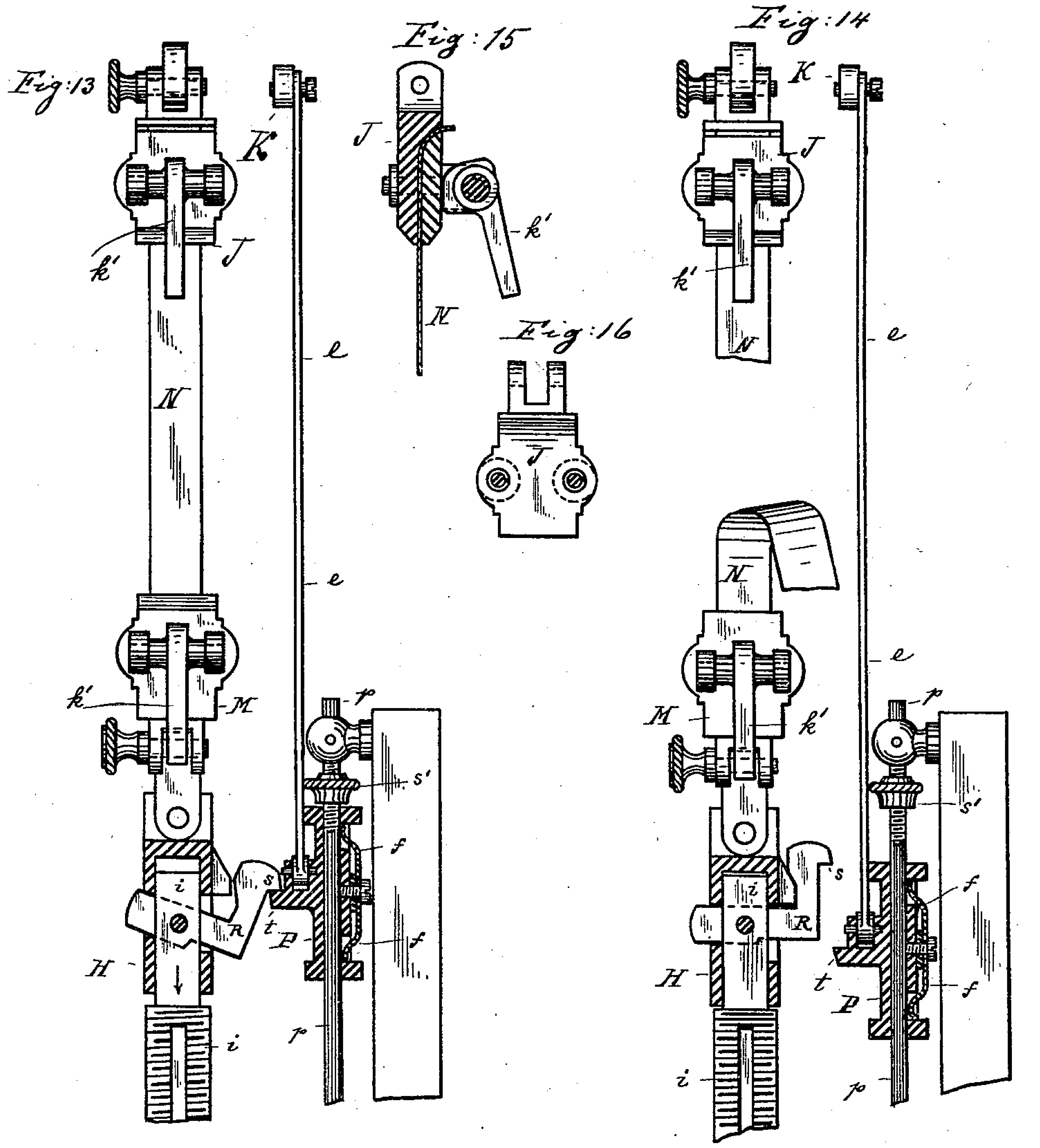

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UNITED STATES PATENT OFFICE.

LOUIS SCHOPPER, OF LEIPSIC, GERMANY.

TESTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 521,323, dated June 12, 1894.

Application filed July 12, 1893. Serial No. 480,221. (No model.) Patented in Germany November 9, 1888, No. 47,745, April 3, 1890, No. 53,635, and January 28, 1891, No. 58,982; in Austria-Hungary September 2, 1889, No. 10,577 and No. 29,542, and in England November 15, 1890, No. 18,431.

To all whom it may concern:

Be it known that I, LOUIS SCHOPPER, of Leipsic, in the Kingdom of Saxony, Germany, have invented an Improved Testing-Machine, (for which I have obtained patents in Germany, No. 47,745, dated November 9, 1888, No. 53,635, dated April 3, 1890, and No. 58,982, dated January 28, 1891; in England, No. 18,431, dated November 15, 1890, and in Austria-Hungary, No. 10,577 and No. 29,542, dated September 2, 1889,) of which the following is a specification.

This invention relates to a machine which indicates the strength and ductility of materials or in other words, the point at which the material breaks and in addition thereto the extent to which it is stretched.

In the accompanying drawings: Figure 1 is an end view of my improved testing machine; Fig. 2 an elevation thereof; Fig. 3 a section on line U, U, Fig. 2; Fig. 4 a section on line W, W, Fig. 2; Fig. 5 a side view of upper end of lever D, showing clamp J, engaged by catch T; Fig. 6 a similar view with the clamp disengaged; Fig. 7 an end view of segment n'; Fig. 8 a section on line V, V, Fig. 5. Figs. 9 and 10 are side views of upper end of lever K, showing it in different positions. Fig. 11 is a side view and Fig. 12 a top view of catch T. Figs. 13 and 14 are longitudinal sections through the supporting mechanism of the lower clamp showing the lever R, in and out of engagement. Fig. 15 is a longitudinal section of the upper clamp and Fig. 16 an elevation thereof.

The letter A, represents a standard projecting upwardly from a base plate and supporting the straining or tension lever D, that carries the weight G. This weight is removable and is adapted to the material to be tested. To the lever D, is secured a hand E, which is moved over a scale F and indicates the point at which the sample will break. A click or clicks d, serve to arrest the lever as soon as this breaking takes place. The upper clamp J, for holding the top of the sample, is secured directly to a rearwardly projecting arm or segment n', of the weighted lever D. The lower clamp M, is connected in manner hereinafter described, to a draw bar e, which is connected at its upper end to lever K, having a finger g, that travels over scale L, (Figs. 2 and 3.)

The article N, to be tested is attached to the clamps J, M, and as the lower clamp is drawn down, a tension will be produced. The degree of this tension will be indicated by the extent of motion of the lever D. Simultaneously, however, the lower clamp M, will move downward and away from the upper clamp for a distance equal to the expansion of the sample. This motion of the clamp M, will cause the rod e, to oscillate lever K, so that the finger g, will indicate the degree of expansion on scale L. As soon as the sample N, breaks, the clicks d, will engage curved rack b, and arrest the lever D. The hand wheel B, by which the machine is driven, is of course stopped as soon as the tearing of the sample takes place and thus the clamp M, will then have assumed its lowermost position and will by its position also properly set the hand g, of the elongation scale. Thus the point of severance, as well as the degree of ductility can be readily ascertained.

In order to ascertain the strength of smaller bodies with accuracy, various details of construction are required which cause a delicate co-operation of the parts.

The upper and lower clamps should be normally always at the same distance apart, so that the several samples tested are all of the same length. The upper clamp J, is provided with a pin i', adapted to be engaged by a pivoted catch or lever T, having a groove a', (Figs. 11 and 12.) The lower clamp M, is provided with a spindle i, (Figs. 1 and 2) which is surrounded by nut M', revoluble by bevel gear R'. To the hub of wheel R', is secured a pin d'. A plate c', surrounds the work shaft g', and is provided with pin e', having head b', and passing through bracket D'. The head b', is engaged by a forked lever h', which in turn is engaged by head u', of the spindle i. As the spindle ascends, the lever h', is oscillated by head u', to draw the plate c', down. A pin d^2, on this plate will thus be brought into reach of pin d', of wheel R', which prevents a further revolution of the shaft g'. In this way the lower clamp will be set to a definite point and the initial distance between both the clamps will always be the same. The clamp is slotted so that the sample N, can be readily introduced (Fig. 15), when it is locked in place by an eccentric lever k'.

In order to prevent the transmissions of the strain from being disturbed by the vibration of the weighted lever and to cause the strain to take place always in the direction of the major axis of sample N, the lever D, is provided with segment n', over which the draft chain Z′, winds and unwinds (Figs. 5 and 6). The elongation lever K, is provided with a toothed segment n^2, engaged by the draw bar or rack e, (Figs. 9 and 10.) In both cases the transmission of the power during oscillation of levers D and K, will always be uniform and consequently the strength of the sample N, can be ascertained with accuracy.

In order to cause the rack e, and hand g, to be arrested at the moment the sample breaks and thus permit the correct reading of the scale, the lower clamp is so balanced as not to affect the sample by its own weight. To this effect the spindle i, is surrounded by a sliding collar H, carrying the clamp M, (Figs. 1, 2, 13, and 14.) The upper end of the spindle i, is connected with angle lever R, having nose s. At the beginning of the operation, when the sample N, is stretched, the nose s, will be engaged by projection t, of a slide P, connected to draw bar e, and thus the collar H, supporting clamp M, will be relieved. This is of great importance when delicate threads or bands are to be tested. The slide P, is intimately connected with draw bar e, and consequently with hand g, and may be vertically adjusted by means of set screw s', on rod p. A friction spring f, prevents the slide P, from slipping. The lever R, is supported by the projection t, of slide P, as long as a stretching of sample N, takes place (Fig. 13). As soon as the sample is torn, the collar H, drops and the lever R, is moved away from projection t, of slide P, (Fig. 14.) The slide P, by spring f, remains at the exact position it has assumed when the sample tore. In this way an immediate and positive arrest of hand g, is effected.

The operation of the entire machine is as follows: The sample is secured in place and by turning screw s', the tension hand is placed at zero. The nose s, of lever R, will in this position rest upon projection t, of slide P, (Fig. 13.) By means of hand wheel B, the sample is stretched, while the amount of the stretching is transmitted by lever R, to draw bar e, and hand g. At the moment the sample tears (Fig. 14), the clamp M, drops and the lever R is disengaged from projection t, while the latter retains its position. This produces a very delicate measurement and as the clamp M, is held by lever R, at the beginning of the operation the thinnest threads or bands may be tested.

The machine is always reliable and exact because springs are not used for producing the tension, but only rigid positively operating parts. Moreover the machine contains such few movable parts, that neither dead motion nor objectionable frictional wear will take place.

What I claim is—

1. The combination in a testing machine of a tension lever and an arm for measuring the elongation, with an upper clamp secured to the tension lever and with a lower movable clamp connected to the arm, substantially as specified.

2. The combination of scale F, having rack b, with weighted lever D, having pawl d, lever R, having nose s, slide P, having projection t, and with rod e connected to the slide, and lever K connected to the rod, substantially as specified.

3. The combination of weighted lever D, having segment n', with lever K, having toothed segment n^2, and with chain Z′, for engaging segment n', and rack e, for engaging segment n^2, substantially as specified.

4. The combination of lever D, with clamp J, having pin i', and with catch T, having notch a', to engage said pin, substantially as specified.

5. The combination of shaft g', with spindle i, having head u' lever h', pin e', plate c', having pin d^2, and with bevel wheel R′, having pin d', substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS SCHOPPER.

Witnesses:
MAX MATTHAI,
CARL BORNGRAÄBER.