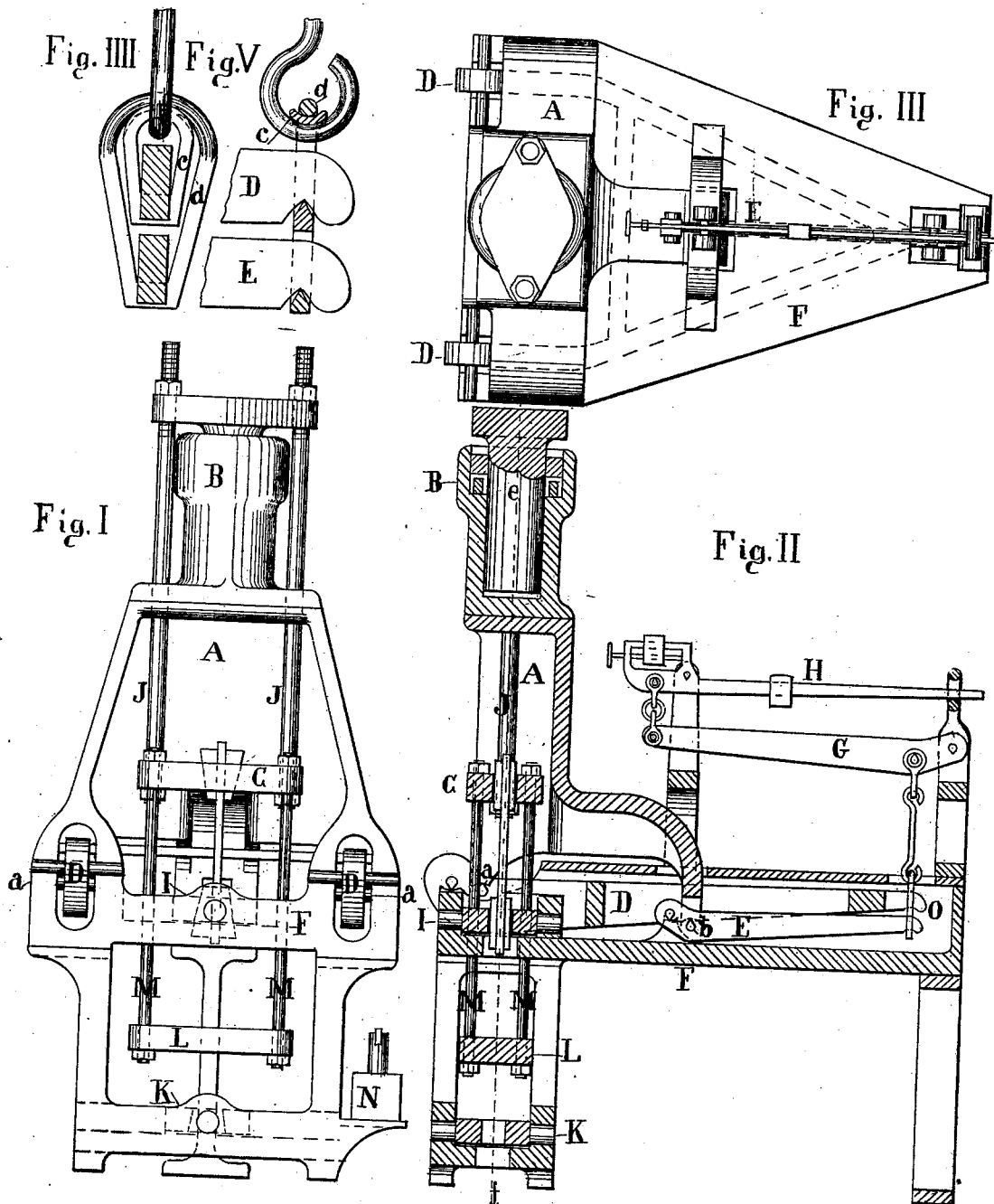


T. OLSEN.
Testing Machine.
Patented April 8, 1879.



Witnesses.

J. N. De Haven,
Chas. Robson

Inventor.

Tinius Olsen

UNITED STATES PATENT OFFICE.

TINIUS OLSEN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN TESTING-MACHINES.

Specification forming part of Letters Patent No. **213,998**, dated April 8, 1879; application filed October 18, 1878.

To all whom it may concern:

Be it known that I, TINIUS OLSEN, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Testing-Machines, of which the following is a specification:

The invention relates to improvements in vertical testing-machines using a hydraulic jack for producing the strain on the specimen to be tested.

Heretofore such machines have been made with the hydraulic jack at the bottom, in which case an extra device has been used to raise the jack into position, and also one for checking the recoil of the same when breaking a test specimen.

The jack has been placed at the top of the machine, in which case it will, by its own weight, return into position; but the recoil and the device for the counterbalancing of the weighing-levers have been objectionable.

The object of my invention is to provide a system of levers by which the jack can be placed at the top, and so be able to omit the arrangement for forcing the plunger back after a test has been made, as the weight of the plunger and its connections will do that by gravity alone.

The object, also, is to dispense with any extra lever arrangement to keep the weighing-beam in equipoise, as heretofore has been necessary when the jack has been placed at the top and the connection with the weighing device made direct to the lower end of the specimen to be tested.

The object, also, is to arrange the parts of the machine in the most convenient manner possible for the operator in making the different kinds of tests that may be required.

The invention consists in the arrangement of the main or first lever with a second or auxiliary lever on a different level from the first, together with the frame that supports the jack.

It also consists in the connection of the two levers; and, finally, in an arrangement for making tensile tests with a large range of length.

In accompanying drawings, in which similar letters indicate like parts, Figure I is an end elevation; Fig. II, a side section through the center of machine. Fig. III is a plan of it. Fig. IIII is a view of the connection be-

tween the two main levers and an intermediate lever; Fig. V, a section through the same.

In Figs. I and II, C is a cross-head or tool, suspended by rods J from the cross-head of hydraulic jack B, resting on the frame A, which rests or is supported on the fulcrums *a* of a double-armed main lever, D, and the fulcrum *b* of lever E. D and E are counting-levers of the same count, and connected at their ends, as shown at O, to the intermediate lever, G. The short ends of levers D and E are supported on bearings in frame F.

At O will be seen two links, *c* and *d*, one above the other. (See Figs. IIII and V.) Link *c* is made concave on the top, so as to receive link *d*. The strain on either of the links is transmitted in the same line, and each link has freedom to adjust itself to this line. Through links *c* and *d* the strain is communicated by proper connections to lever G and weighing-beam H, which is similar to the beam of an ordinary platform-scale.

The center-line *ef* of hydraulic jack B and of the line of strain is placed a small distance back from fulcrum *a* of lever D toward the lever E. The lever E has to carry only a small portion of the total pressure, dependent on the distance the center-line *ef* of jack B is placed back from the fulcrum *a*, and this distance need not be greater than is necessary to insure stability to the frame A.

The lower end of the tensile-test specimen is held either in block I or K, both of which are secured in the frame-work. The combination of the two blocks I and K with the adjustable top cross-head, C, which is made adjustable by the screwed ends and nuts on the upper ends of rods J, provides means for a great variation in length of tensile-test specimens.

Cross-head or block L is suspended from cross-head C by bolts or rods M, the space between the cross-head L and frame F above to be used for compression and transverse tests.

The operation of the machine is as follows: For tensile tests the upper end of the specimen is secured in block C, and the lower end in block I or K, according to the length of specimen. When K is used the cross-head L is removed by unscrewing the nuts on rods M. The strain is applied with the jack B, the jack

B being connected to a pump, N, by a flexible or jointed pipe, so as not to interfere with the weighing arrangement. The strain put upon the specimen is transmitted from the jack B, through the frame A, to the levers D and E. These having proper connections with the weighing-beam H, the strain is balanced on same and indicated.

For compression and transverse tests the specimen is placed upon the cross-head L, and pressed up against proper projections on the frame-work F by the jack, and the strain balanced and ascertained as in making tensile tests.

What I claim, and desire to secure by Letters Patent, is—

1. The frame A and levers D and E, in combination with jack B, lever G, and beam H, as and for the purpose herein specified.

2. The links c and d, in combination with the levers D and E, as and for the purpose herein set forth.

3. The blocks I and K, in combination with cross-head C and jack B, arranged as and for the purpose herein set forth.

TINIUS OLSEN.

Witnesses:

T. N. DE HAVEN,
CHAS. ROBSON.