2 Sheets—Sheet 1

T. OLSEN.

Testing-Machine.

No. 213,525. Patented Mar. 25, 1879.

Fig. 1.

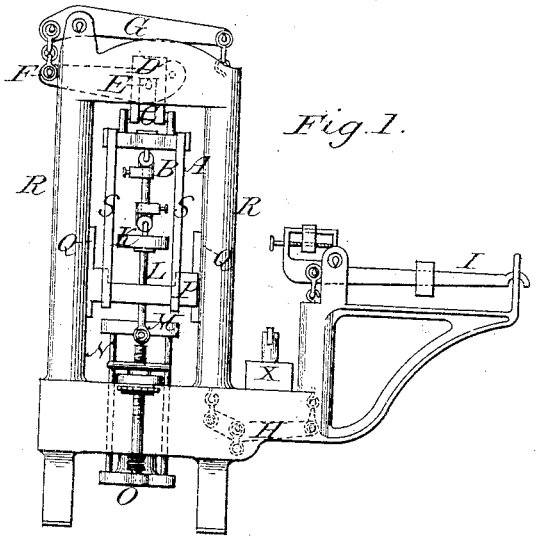

Fig. 2.

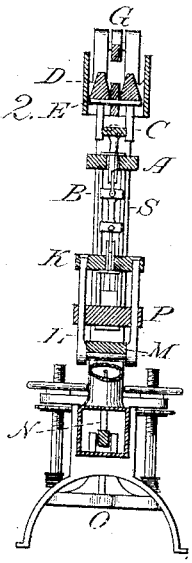

Fig. 3.

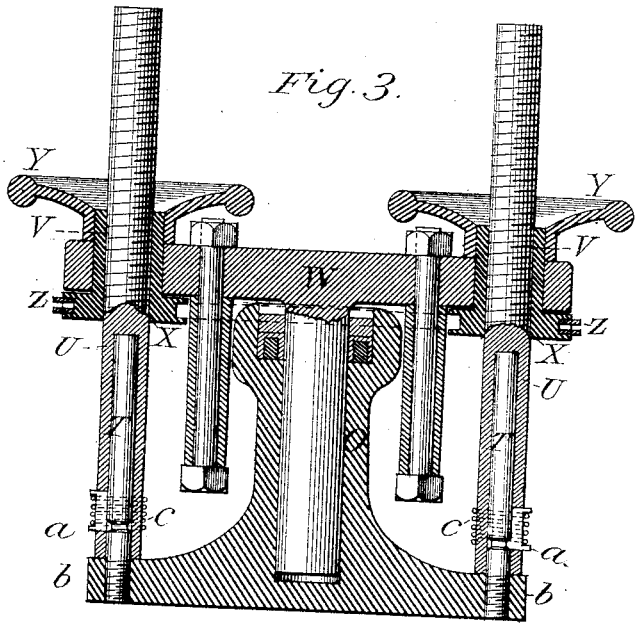

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Fig. 4.

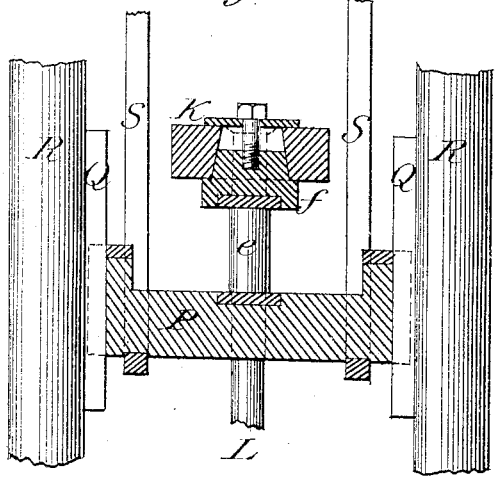


Fig. 5.

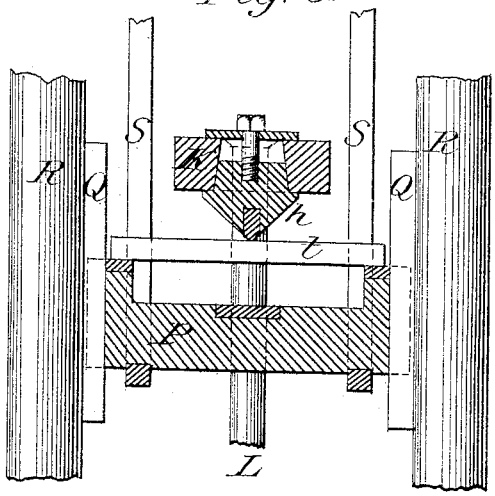


Fig. 6.

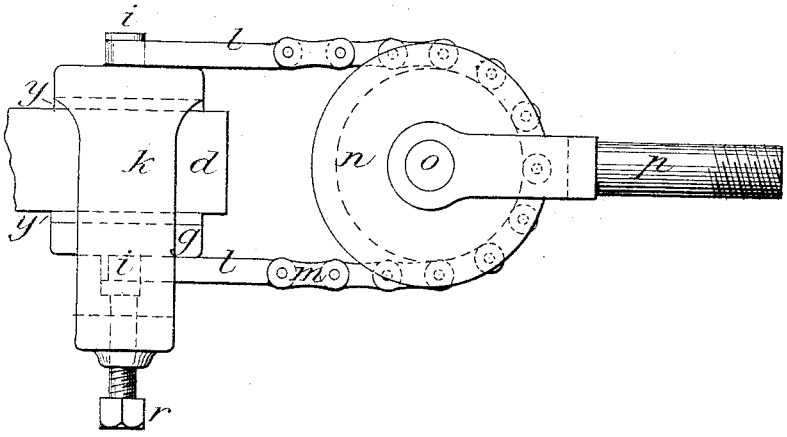
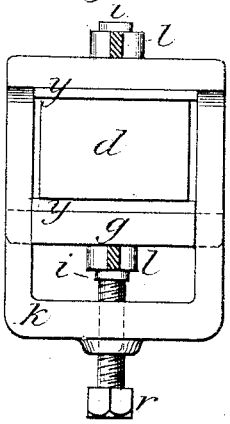


Fig. 7.



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UNITED STATES PATENT OFFICE.

TINIUS OLSEN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN TESTING-MACHINES.

Specification forming part of Letters Patent No. **213,525**, dated March 25, 1879; application filed October 11, 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 more particularly to testing-machines in which the specimen is held in a vertical position, and also to the manner of securing the same.

Heretofore such vertical testing-machines, as they are called, have been principally constructed for producing tensile tests only, and when compression or transverse tests were to be made they could not readily be done, excepting by the introduction of expensive appliances, which also required considerable time and inconvenience to place in position and remove again, and are consequently objectionable.

In machines of this style, in which a hydraulic jack has been the means of applying the strain to the specimen, the leakages and other defects attributable to valves and packing have been the serious obstacle to retaining a certain pressure or strain on the specimen for any desired length of time, as is often necessary; also, the former plan adopted for holding specimens for tensile strain is objectionable, especially of brittle substances or such having little or no ductility, as the line of strain seldom adjusts itself to the center of the specimen. This has most clearly been demonstrated in testing such specimens as cement.

The object of my invention is to provide an ordinary vertical testing-machine with a device combining simplicity of construction, with a wide range of usefulness, for applying several kinds of test; also, for an effectual means of holding the strain exerted upon a specimen by a hydraulic jack for any length of time desirable, and, further, for adjusting the line of strain to the center of the specimen.

The invention consists in so arranging the specimen or tool holders that the different tests can be accomplished.

It also consists in the arrangement of the hydraulic jack, with certain application of screws and chain-wheels, so as to hold the strain upon the specimen.

It finally consists in the manner in which the specimen is held.

In the accompanying drawings, in which similar letters of reference indicate like parts, Figure I is an elevation embodying my invention; Fig. II, a vertical cross-section through the center of the machine; Fig. III, enlarged section through jack; Fig. IIII, section of details as applied for compression-tests; Fig. V, as applied for transverse tests; Fig. VI, side view; Fig. VII, plan of tools for holding specimen.

A cross-head, A, Figs. I and II, to which the top tools B are secured, is suspended on the pivot E of lever F by the bars C and steel bearings D, and the strain to which the specimen is subjected is transmitted to the graduated weighing-beam I through the levers G and H, all of which are properly connected together. The lower specimen-holders are secured in the cross-head K, which, by rods L, cross-head M, and rods N, are connected to the hydraulic jack O.

Between cross-heads K and M is a cross-head, P, guided on both sides in long guides Q on the frame-work or columns R. Through same cross-head P the rods L move easily. The object of having the rods L pass through the cross-head P is to hold the same in proper position—viz., to hold the rods L and the cross-heads K, M, and P in proper position.

The cross-head P is suspended by links S from the upper cross-head, A, and thereby making it a part of the weighing mechanism of the machine.

To the lugs *b*, projecting out on both sides from the bottom of hydraulic jack O, Fig. III, are rods T secured. On the rods T fit the sleeves U, which extend upward above the rods T as screws, and run as such through the threaded sleeves or nuts V, which pass through the ends of the cross-head W of the plunger in the jack O. Sleeves V have secured on their under sides the chain-wheels X. On their upper sides are secured the hand-wheels Y. The chain Z will transmit to the other sleeve any motion that one sleeve may receive. In sleeves U are pawls *a*, which, when the sleeves U are all down upon the lugs *b*, fit into a groove on rods T, and are held

there by suitable pressure obtained from springs *c*.

Figs. VI and VII—the yoke *k* embraces one end of a test specimen, *d*, and also the sliding block *g*, yoke *k* and sliding block *g* to be lined on the side next to the specimen with leather or some other more elastic substance, if required, to suit the nature of the material to be tested.

On the yoke *k* and sliding block *g* are journals *i i*. The center of these journals is in the same line and in the center of the yoke and block. On journals *i i* are links *l*, connected together by the chain *m*. This chain runs over the pulley *n*, which is free to revolve on pin *o* in yoke *p*. In the yoke *k* is a set-screw, *r*, which presses the sliding block *g* up against the specimen *d* sufficiently to create the necessary friction to hold it. On the other end of the specimen is a similar arrangement.

The yokes *p* are secured in the testing-machine in the ordinary manner by pins, bolts, or wedges.

It will be seen that by this arrangement the line of strain will adjust itself to the center of the specimen at the point where it is held.

Instead of the screw *r* to produce the pressure upon the specimen, wedges, or the two combined, may be used, and instead of pulley *n* an equal lever may be adopted.

The operation of the machine will be as follows: For making tensile tests, if the jack is down, the sleeves are screwed down with any or both of the hand-wheels until the pawls *a* will be in their corresponding grooves on rods T. The motion of the hand-wheels is then reversed and the jack lifted up to any desired height within its limit. The specimen or tools holding the same, as the case may be, are secured to the cross-heads A and K. The jack is then forced down by pressure of a fluid pumped into it by an ordinary hydraulic pump, *x*, and the strain exerted upon the specimen is communicated, through the system of levers, to the weighing-beam I and balanced.

The arrangement for compression-tests is shown in Fig. IIII. The test specimen *e* is placed upon the cross-head P. Under cross-head K is secured a block, *f*, so as to make a level and parallel surface with the top of cross-head P. The jack is forced down, and the remainder of the operation is similar to that of making a tensile test.

The arrangement for transverse test is shown in Fig. V. The test specimen *t* is placed upon the cross-head P, each end of which extends upward, and provides a space under the specimen for the deflection or bending of the same. To the cross-head K, and underneath the same, is secured a blunt V-shaped block, *h*. The jack, and with it the cross-head K and block *h*, is forced down, and the test made in a similar manner as a tensile test.

What I claim is—

1. Cross-head P and suspension-links S, in combination with the cross-heads A and K, arranged as and for the purpose specified.

2. The rods T, sleeves and screws U, nuts V, chain-wheels X, chain Z, pawls *a*, and spring *c*, in combination with jack O and cross-head W, substantially as described, as and for the purpose set forth.

3. The yoke *k*, sliding block *g*, links *l*, chain *m*, pulley *n*, yoke *p*, and set-screw *r*, arranged as and for the purpose herein specified.

TINIUS OLSEN.

Witnesses:

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CHAS. ROBSON.