T. Y. OLSEN.

TESTING MACHINE.

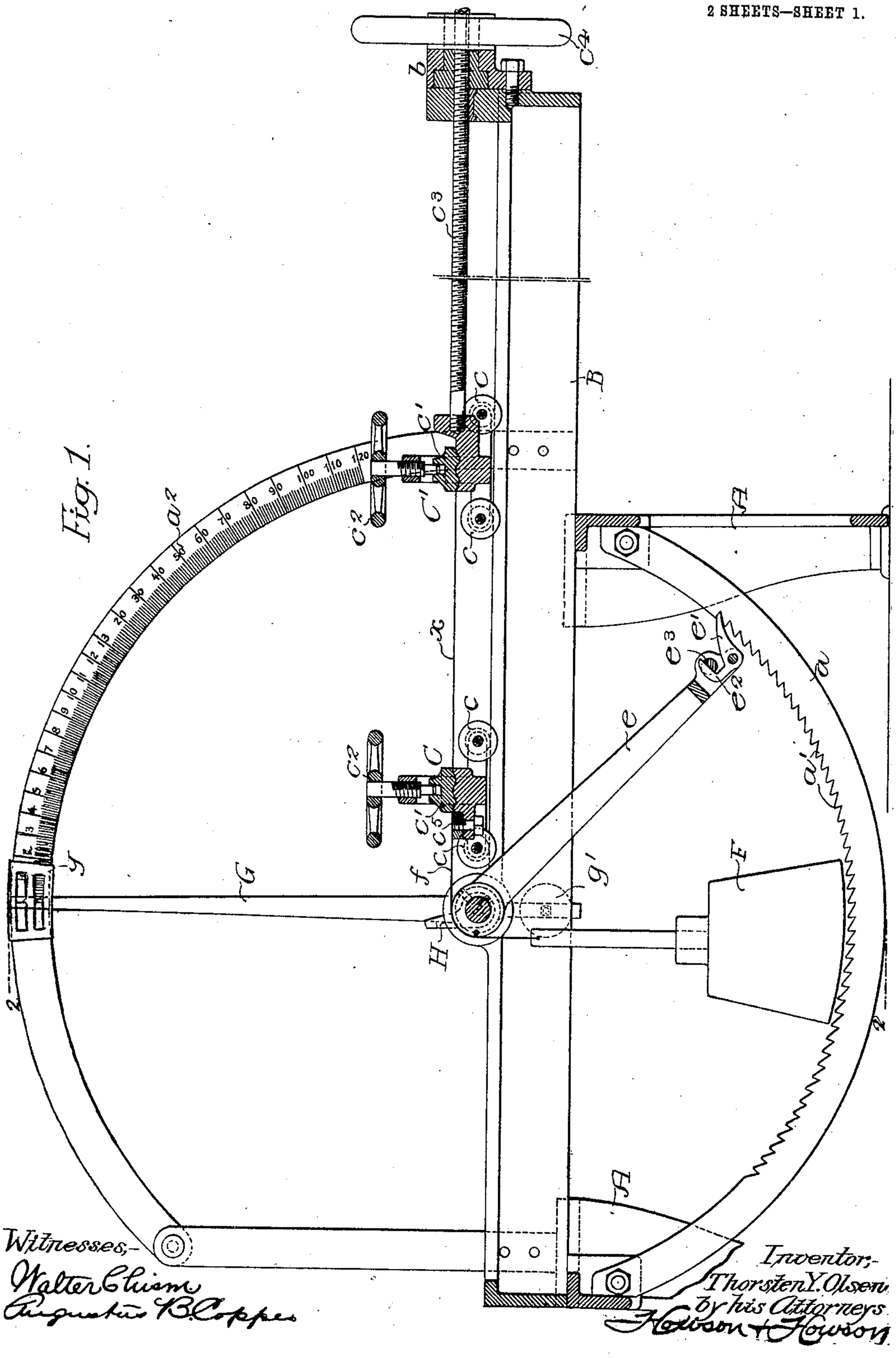
APPLICATION FILED AUG. 3, 1908.

925,131.

Patented June 15, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 4.

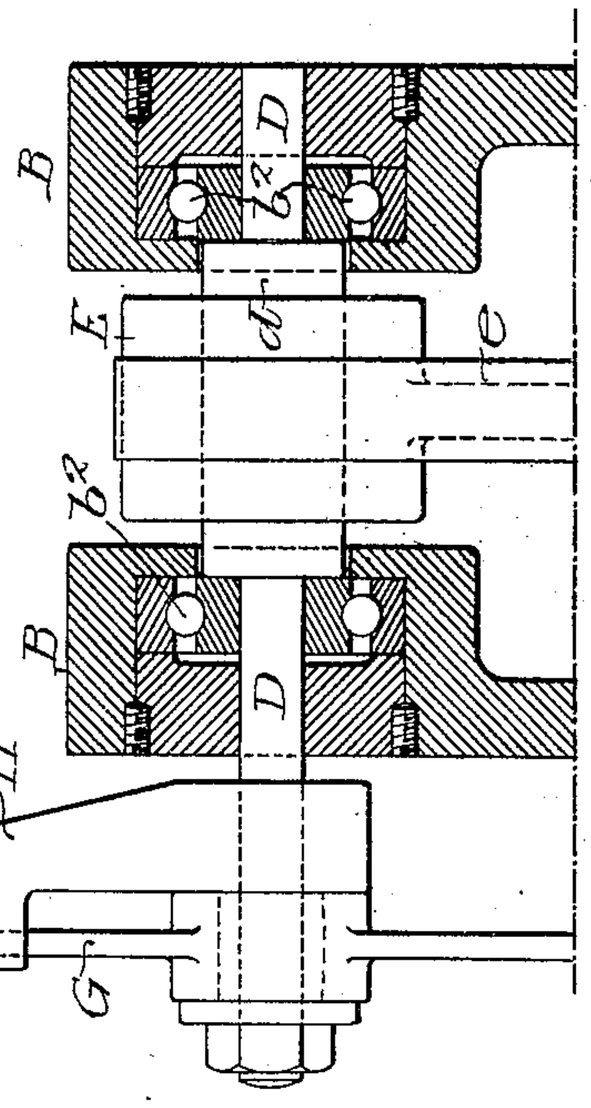


Fig. 3.

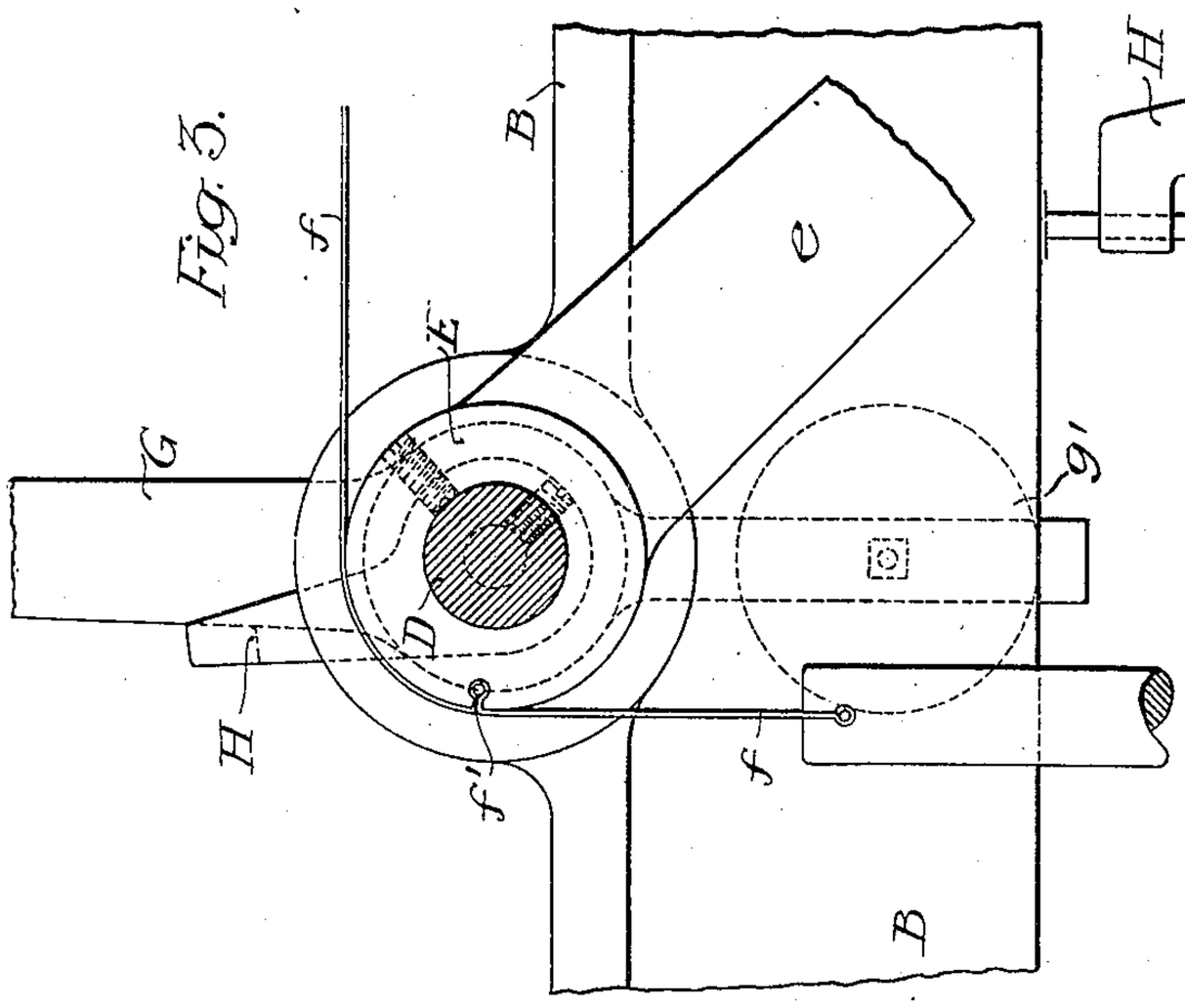
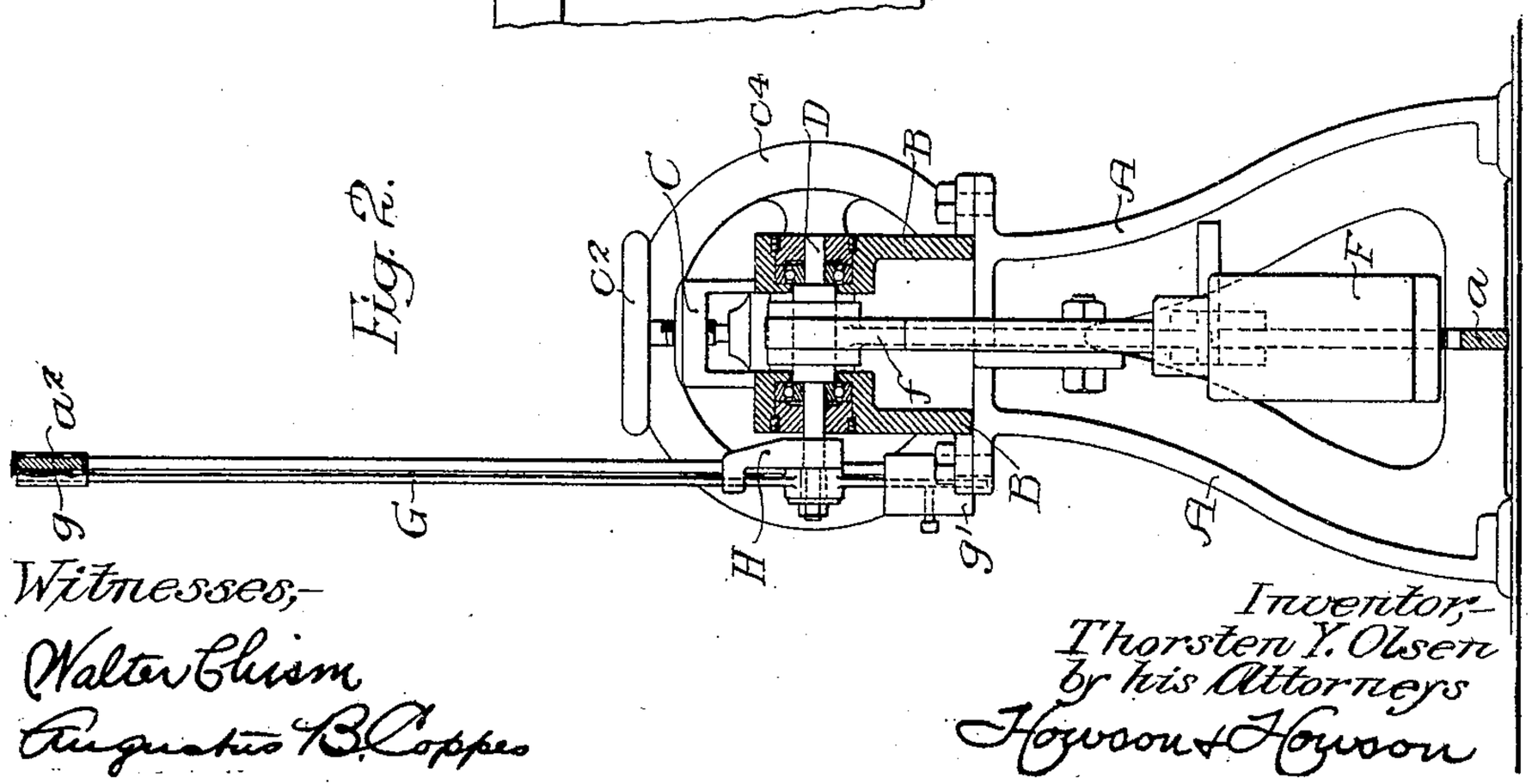


Fig. 2.



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UNITED STATES PATENT OFFICE.

THORSTEN Y. OLSEN, OF PHILADELPHIA, PENNSYLVANIA.

TESTING-MACHINE.

No. 925,131. Specification of Letters Patent. Patented June 15, 1909.

Application filed August 3, 1908. Serial No. 446,785.

To all whom it may concern:

Be it known that I, THORSTEN Y. OLSEN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Testing-Machines, of which the following is a specification.

One object of my invention is to provide an uncomplicated and relatively inexpensive though substantial machine for testing the tensile strength of materials, which shall have a relatively high capacity and be of such a construction as to employ one continuous scale for specimens having either high or low tensile strength.

Another object of my invention is to provide a machine for testing the tensile strength of materials, which shall be capable of accurate use both for determining relatively small tensile strengths as well as those of materially greater amount.

These objects and other advantageous ends I secure as hereinafter set forth, reference being had to the accompanying drawings, in which:—

Figure 1, is a side elevation, partly in section, illustrating the preferred construction of my invention:—Fig. 2, is a vertical section on the line 2—2, Fig. 1; Fig. 3, is an enlarged side elevation, partly in section, illustrating certain details of the machine; and Fig. 4, is a vertical section through the main supporting spindle of the machine.

In the above drawings, A represents the supporting framework of the machine, in the present instance consisting of two standards upon which are horizontally mounted a pair of substantially parallel beams B formed in the present instance as a single casting and joined at their ends.

Two carriages C and C′ are mounted to move upon said beams, each carriage being provided with four flanged wheels c which operate on the adjacent top edges of the beams.

Each carriage is provided with a clamp c' operated by a hand wheel c^2 whereby a specimen to be tested, indicated in the present instance as a wire x, may have its ends attached to the carriage, and of these the carriage c' is engaged by a threaded rod c^3 which passes through an abutment b mounted at one end of the beam B and enters a threaded nut formed in or attached to a hand wheel c^4.

A toothed or ratchet bar a is fixed at its two ends to the two standards constituting the supporting framework A and is curved to a circular arc, its teeth being formed in its inner edge as indicated at a'.

As indicated in Fig. 4, each of the beams has an upwardly extending projection in which is mounted a ball bearing b^2 for the reception of a horizontal shaft D provided with a thickened hub d where it extends between the beams B. To this hub is fixed a collar E, from which extends an arm e carrying at its end a pawl e' so placed as to coöperate with the teeth a' of the ratchet segment a. This pawl has an arm e^2 normally engaging the flat portion of a pin e^3 which is mounted in the arm e and which may be turned at will so as to cause movement of the pawl e' upon its supporting pivot for the purpose of causing it to disengage the teeth a'.

A steel or other band f of suitable flexible material is connected at one end to the carriage C, in the present instance by means of a clamp c^5, and passes around the collar E, as illustrated in Fig. 3, having hung from its end a relatively heavy weight F. Said band, however, is positively attached to said collar E by being caused to enter a recess therein, being held in place by a pin f. The point of attachment of this band to the collar is at or slightly above a point at the middle of one side thereof when the various parts of the machine are in their normal or operative positions, and when the collar carrying arm e extends as shown in Fig. 1, with its pawl at one end of the series of ratchet teeth a'.

One end of the shaft D extends beyond the outer side of one of the beams B and has loosely mounted upon it a pointer G whose upper end carries an indicator g movable over and designed to co-act with a circularly curved, graduated bar a^2, supported in any desired manner from the beams B or the main frame of the machine. The opposite or lower end of the pointer G has fixed to it an adjustable weight g', so that while it is easily moved to any given position, it is so far balanced as to remain where it is placed. There is also mounted upon the shaft D adjacent to the pointer G an arm H, which is fixed to said shaft and is extended sidewise so that it normally engages or rests in contact with the pointer G and compels it to turn in one direction with the shaft D.

Under operating conditions the ends of the specimen to be tested are respectively

clamped to the ends of the carriages C and C′, and tensile stress is applied thereto by proper manipulation of the wheel c^4. During the application of this stress it is obvious that a stress of an equal amount is applied to the band f which gradually raises the weight F; it being understood that the displacement of the arm e from the normal position in which it is held by said weight is proportional to the stress applied to the piece under test. As a result, the shaft D turns in its bearings and consequently causes the pawl carrying arm E to move toward the weight F; it being held by the pawl e' from returning to its zero position in the event of the breaking of the tested piece. At the same time, the revolution of the shaft D causes the arm H to move the pointer G and its indicator g to an amount proportionate to the magnitude of the stress applied, and since as above noted, the pawl e' prevents the return of the arm e and the shaft F to their normal positions when the test piece breaks, the pointer indicates the maximum breaking strength;—the friction between the graduated segment a^2 and the slide or indicator g holding the latter in place until it is returned by hand to its normal position.

In the foregoing description, it has been assumed that the piece under stress possessed but little tensile strength, but if the contrary were the case, the machine would still be available for use without adjustment, since by the continued operation of the hand wheel c^4 the weight F would be raised and the shaft D turned, until the arm e came into contact with the side of said weight. Thereafter the swinging or displacement of the arm and weight, while still proportional to the stress applied, bears to the amount of such stress a ratio different from that existing before the positive engagement of the arm e with the weight F. As a consequence, the first part of the scale a^2 passed over by the indicator is provided with graduations which represent such units as ounces or fractions thereof, while the second part of the scale which is passed over by the indicator, while the arm e positively engages the weight F, is graduated in divisions which represent larger units, such as pounds and fractions thereof. While therefore the scale is a continuous one, in reality it consists of two distinct parts, one of which may be graduated in one set of units while the other is graduated in other units. In any case, when the specimen under test is broken, the weight F is held from falling to its normal position by reason of the engagement of the pawl e' with the teeth of the ratchet bar a, and the pointer also remains at its position of maximum displacement, as above noted, so that a reading of the scale may be taken.

When it is desired to return the parts to their normal positions, the pawl is disengaged from the teeth a' by turning the pin e^3 whose flat portion causes it to be moved upon its pivot.

From the foregoing it will be seen that I have provided a most convenient testing machine of relatively wide range and high capacity; the construction being such that the results obtained are highly accurate both for the low as well as for the high portions of the scale. Moreover, as previously pointed out, the machine is adapted for the testing of materials having low tensile strength as well as for those of higher strengths, without requiring adjustment or re-setting of any of its parts, so that it has an accurate range between limits hitherto requiring two machines to perform the same work.

When the parts of the machine are in their normal positions, the weight F is just sufficient to maintain the arm e at the angle shown, so as to permit the indicator on the pointer G to stand at its zero position. As stress is gradually applied to the piece under test, the amount of movement of the arm e toward the weight F is the measure of the stress applied, and after it has engaged said weight the amount of its displacement or swinging is also proportional to and constitutes the measure of the tensile strength acting on the wire or fiber.

I claim:—

1. The combination in a testing machine of an indicator, means for applying stress to a body to be tested, the same including means for engaging the body under test, and a device connected to said indicator as well as to said engaging means, said device including a member movable when stress is applied to the body under test to an amount dependent upon said stress, and also having an element opposing a definite portion of the movement of said member in one manner, and opposing another part of such movement in a different manner.

2. A testing machine having means for applying stress to a body to be tested, said means including an element movable to an extent dependent upon the stress applied, and a device for causing the ratio of such movement to the stress to be different when small stresses are applied from that existing upon the application of larger stresses.

3. The combination in a testing machine of an indicator, a scale therefor having a plurality of sets of graduations, and means for applying stress to a body to be tested, the same including means for causing the movement of said indicator to vary with the stress applied to the body under test, and also including a device for causing the ratio of the movement of the indicator to the stress to be different while it is moving over one set of graduations from that existing while it is moving over the other set of graduations.

4. The combination in a testing machine

of two carriages having means for the attachment of the piece to be tested, a device for applying tension to one of the carriages, a movable body connected to the other carriage and having a device tending to operate in a definite manner to oppose movement of said carriage during a certain portion of said movement, said device being constructed to oppose the further movement of said body after it has been displaced to a predetermined extent, in a manner different from that at first occurring, with a stress indicating device for said machine.

5. The combination in a testing machine of a frame, two carriages movable thereon, means for attaching said carriages to a body to be tested, means for applying tension to one of the carriages, a movable arm connected to the other carriage, with a weight for opposing the movement of the arm when tension is applied, said parts being arranged to cause the weight to exert its opposition to the movement of the arm in different ways for different loads on the machine, and an indicator for the machine.

6. The combination of a frame, carriages movable thereon, means on the carriages for the attachment of a body to be tested, means for applying stress to one of the carriages, an arm rotatably mounted on the frame, a weight having means for connecting it to the arm and to one of the carriages to oppose the rotation of said arm when stress is applied, said weight being placed to be directly engaged by said arm after the latter has moved to a predetermined extent, with an indicator connected to said mechanism.

7. The combination in a testing machine of a frame, means including a carriage for applying stress to a body, an arm rotatably mounted in the frame, a weight, a flexible member operatively connecting the weight, the arm and the carriage, said weight and arm being arranged so that the weight through the flexible connection opposes displacement of the arm for one part of the movement thereof, and is directly engaged by the arm through another part of the movement, with means for indicating the stress applied.

8. The combination in a testing machine of a frame, having a graduated scale, an indicator coöperating with said scale, a spindle having a projecting arm connected to said indicator, means for applying stress to the body to be tested, the same including a carriage, a flexible connection attached to said carriage and to said arm, with a weight hung from said connection and placed to be engaged and swung out of its normal position by said arm after the latter has been moved a predetermined distance by the stress applied to the body.

9. The combination in a testing machine of a frame, a ratchet bar mounted thereon, a rotatably mounted arm having a pawl cooperating with said ratchet bar, carriages movable on the frame and having means for the attachment of the body to be tested, means for applying stress to the body under test, a weight, a flexible member connecting one of the carriages, the pawl-carrying arm and the weight, said weight being arranged to act through the flexible member to oppose movement of the arm to a predetermined extent, and thereafter be directly engaged by said arm, with means for indicating the amount of stress applied.

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

THORSTEN Y. OLSEN.

Witnesses:
EARL B. SMITH,
HENRY C. BONNY.