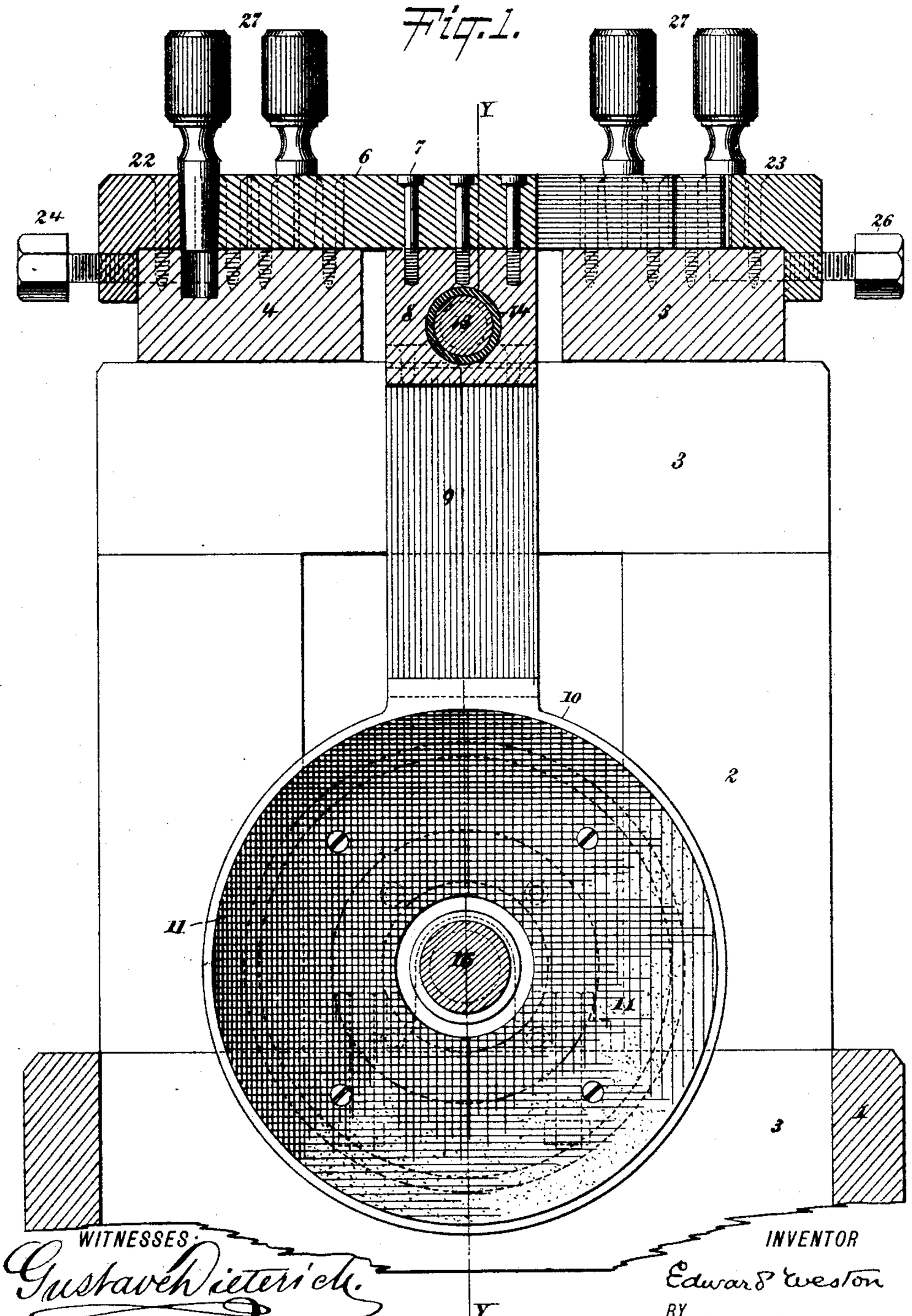
(No Model.) 3 Sheets—Sheet 1.

E. WESTON.

RHEOSTAT.

No. 480,892. Patented Aug. 16, 1892.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

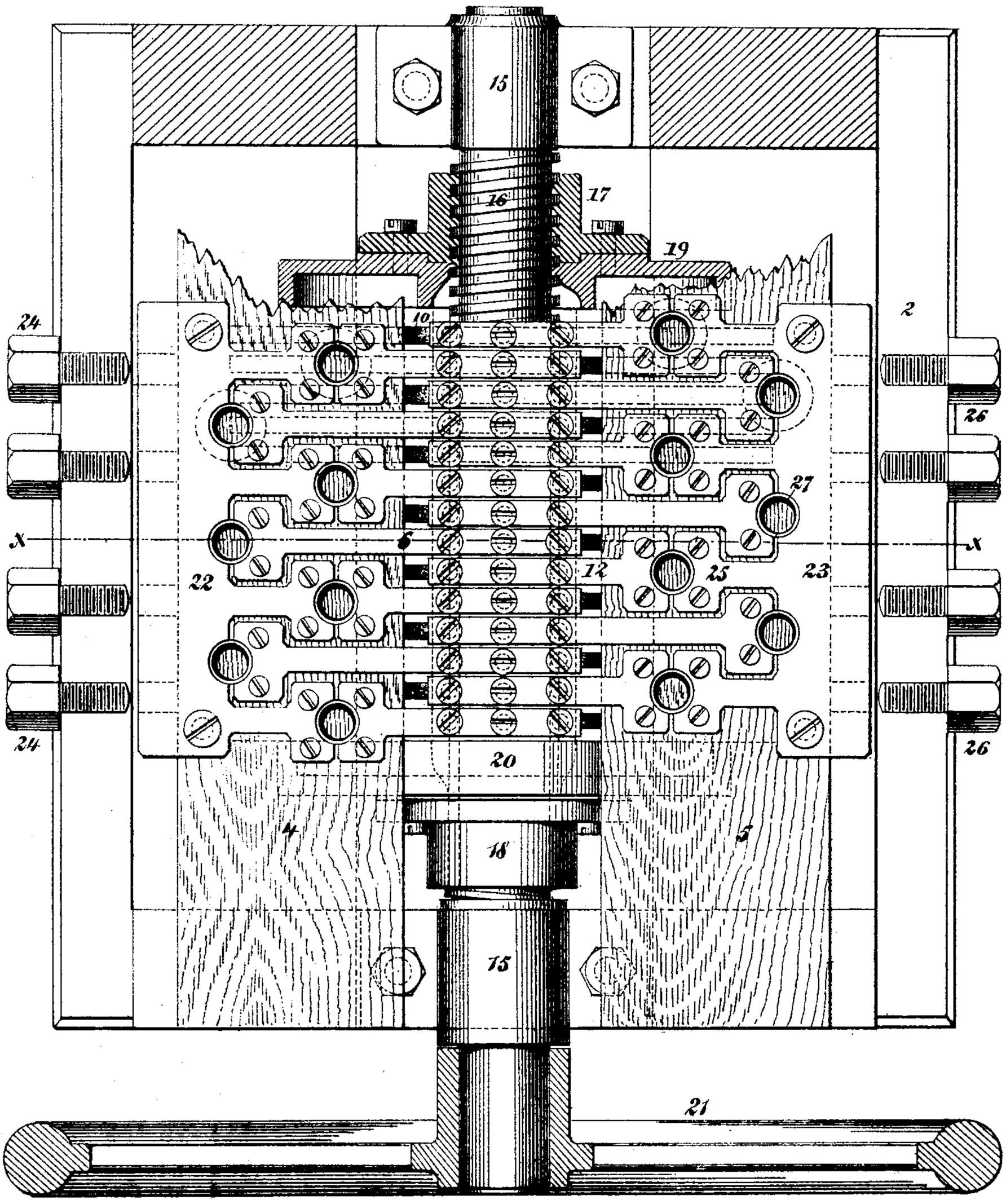

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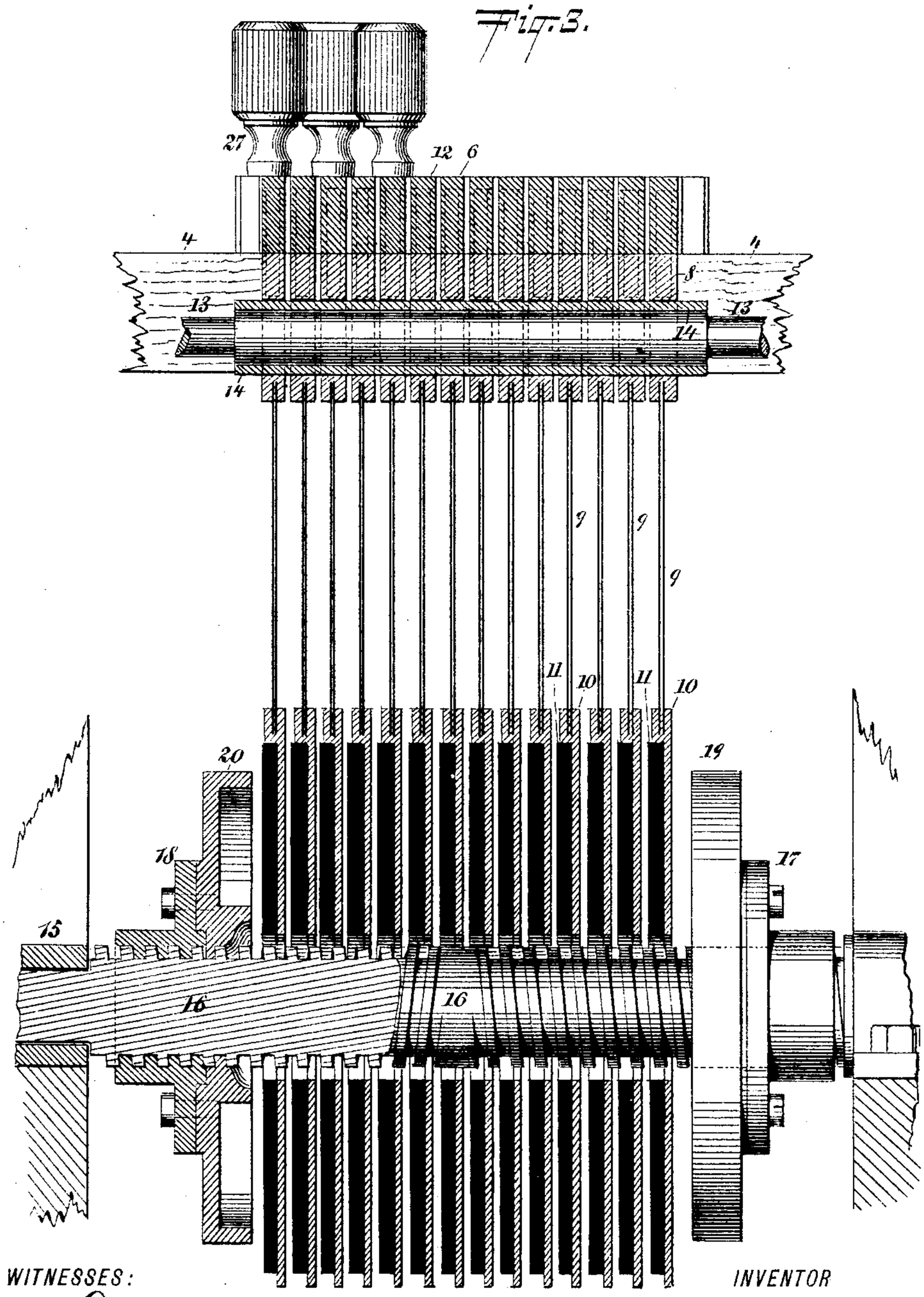
Fig. 3.



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UNITED STATES PATENT OFFICE.

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RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 480,892, dated August 16, 1892.

Application filed December 5, 1891. Serial No. 414,103. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WESTON, of Newark, Essex county, New Jersey, have invented a new and useful Improvement in Resistance Apparatus, of which the following is a specification.

My invention consists in a new form of resistance apparatus which contains two bodies of conducting material supported in juxtaposition and means acting upon both bodies to force them into contact. By regulating the pressure exerted by one body on the other more or less resistance is caused in a circuit including said bodies.

In the accompanying drawings, Figure 1 is a transverse section of my resistance apparatus on the line *x x* of Fig. 2. Fig. 2 is a plan view, a portion being broken away to show the screw and one compressing-head. Fig. 3 is a longitudinal section on the line Y Y of Fig. 1.

Similar numerals of reference indicate like parts.

The base 1 supports a stout framework of uprights 2, transverse cross-pieces 3, and longitudinal upper bars 4 5. The bars 4 5 are of wood or other insulating material, as shown in Fig. 2. Fastened to the upper surface of bar 4 is a metal arm 6, which projects over the longitudinal interval between the bars 4 5. This arm, Fig. 1, has secured to its end by screws 7 a brass plate or block 8. The plate 8 has a central circular aperture, and to its lower side is secured a strip or plate of spring metal 9, which in turn supports a metal annular disk 10. On one face of the disk 10 is fastened by screws or other suitable means an annular plate 11 of carbon.

To the upper surface of bar 5 and immediately adjacent to the arm 6 is secured a metal arm 12, which extends parallel to arm 6 and over the interval between the bars 4 and 5. The arm 12 carries a brass plate or block precisely similar to plate 8, to which is attached by a plate of spring metal similar to 9 a metal annular disk similar to 10, to which is attached a carbon disk similar to 11. The instrument may contain any desired number of arms—such as 6 and 12—alternately projecting from the bars 4 and 5, each carrying the same devices above described, so that, as shown in Fig. 3, we have a series of annular metal disks concentrically disposed one in rear of the other, each insulated from the other and supported by a metallic spring suspension. Each disk, furthermore, carries a carbon plate, which faces the metal back of the next adjacent disk. Finally, the arms 6 12, &c., are so placed on the bars 4 and 5 that the disks are supported by the spring-plates 9 out of contact with one another, but with their central openings in line. The central openings in the plates or blocks 8 are also in line.

Through the openings in blocks 8 passes a metal rod 13, inclosed in a sleeve 14 of insulating material and fastened at its ends in any suitable way in the main frame of the instrument. This serves to prevent edgewise displacement of the plates and to assist in holding them in correct alignment. Centrally disposed on the lower transverse pieces of the base 1 are journal-bearings 15, which receive and in which revolves the screw-shaft 16. On this shaft, inside the bearings, are formed reverse screw-threads, and on the threaded parts of the shaft are nuts 17 and 18. Secured to these nuts are flanged compression-heads 19 and 20, made as substantially shown in section in Fig. 2. The edges of the flanges of these compression-heads bear against the outermost annular disks 10 of the series. The screw-shaft 16 passes through the central openings of the disks and is rotated by the hand-wheel 21 or by any other suitable device.

It will be evident that when the hand-wheel 21 is turned the reverse threads on the shaft 16 will cause the nuts 17 and 18, and hence the heads 19 and 20, to move toward or away from one another, and that in this way the disks may be brought into more or less close contact. It will also be apparent that when the screw-shaft is rotated in the opposite direction the heads 19 and 20 will recede, and that the disks will be separated from one another by the action of their spring-supports 9. It is of course to be understood that the diameter of the disk-openings is sufficiently larger than the diameter of the screw-shaft to allow of the free to-and-fro movement of the disks.

It is well known in the art that the resistance offered to an electrical current by a series of carbon bodies in juxtaposition is less as these bodies are moved into closer contact

and more as this contact becomes less complete, and also that by graduating the degree of compression the amount of resistance offered can be nicely regulated. The above-described mechanism therefore affords a simple and convenient means for subjecting a series of carbon or other plates of high resisting material to a degree of compression which by the gradual action of the reverse screws can be regulated with the utmost nicety.

I will now describe the electrical connections in the instrument. Secured to the bars 4 and 5 are metal plates 22 and 23. On these plates are projecting portions 25. These come opposite to the inner ends of the short arms, as 12, while the inner ends of the long arms, as 6, lie between said portions; but between the extremities of the short arms, as 12, and those of the projections 25 are holes for the reception of metal circuit-establishing plugs 27, and between the ends of the long arms, as 6, and the body portions of the plates 22 and 23 are also similar plug-holes. Finally, entering each plate 22 and 23 are two sets 24 and 26 of four binding-screws. (Shown in place in Fig. 1.) Supposing all the plugs 27 to be in place, a current entering at the posts 24 will pass to the plate 22 and thence to the arms 6 or 12, supported by bar 4, or, in other words, to every other arm 6 or 12 of the entire series, thence to the disks carried by said arms, and from these disks to the adjacent disks carried by the arms supported by bar 5, and thence to the arms which support these disks, and thence to the plate 23 and binding-screws 26. Of course this causes the current to go from one disk to its neighbor and then out, the disks being connected in multiple arc; but it will readily be seen that by suitably adjusting the plugs any number or all of the disks may be placed in series connection, so that the resistance of any number of them can be interposed in a circuit.

In using the instrument the plugs are first adjusted to arrange the disks, as desired, in series or otherwise, and then the screw-shaft is rotated, as desired, to bring the disks into more or less close contact, thus nicely regulating the resistance offered.

I have constructed this apparatus and practically employed it with entire success in commercial electrical work, and I have found it especially useful in all testing operations and in the calibration of the various forms of electrical measuring-instruments of my invention now manufactured by me.

I claim—

1. In an electrical instrument and in circuit, two suspended bodies of conducting material in juxtaposition and a means positively acting upon both of said bodies to force them into more or less close contact.

2. In an electrical instrument and in circuit, a body of conducting material having an elastic or resilient support, a movable body of conducting material, and means positively acting upon both of said bodies to force them into more or less close contact against the elastic or resilient resistance of said support.

3. In an electrical instrument and in circuit, two bodies of conducting material in juxtaposition and each provided with an elastic or resilient support and means positively acting upon both of said bodies to force them into more or less close contact against the elastic or resilient resistance of said support.

4. In an electrical instrument and in circuit, two bodies of conducting material, elastic or resilient supports for said bodies, whereby they are held out of contact with one another, and means for positively acting upon both of said bodies to force them into contact against the elastic or resilient resistance of said supports.

5. In an electrical instrument and in circuit, a body of high resisting material, a metallic body, elastic or resilient supports for said bodies, and means for positively acting upon both of said bodies to force them into more or less close contact against the elastic or resilient resistance of said supports.

6. In an electrical instrument and in circuit, two bodies of conducting material, elastic or resilient supports for said bodies, whereby they are held out of contact with one another, and screws acting upon both of said bodies to force them into more or less close contact against the elastic or resilient resistance of said supports.

7. In an electrical instrument and in circuit, a body of high resisting material, an elastic or resilient support therefor, an abutment, and a screw operating to force said body of high resisting material against said abutment and in opposition to the elasticity or resiliency of said support.

8. In an electrical instrument and in circuit, two conducting-bodies, one being of high resisting material, elastic or resilient supports for said bodies, and screws acting upon both of said bodies to force them into more or less close contact against the resilient or elastic resistance of said supports.

9. In an electrical instrument and in circuit, two bodies of conducting material, elastic or resilient supports for said bodies, an independently-supported screw passing loosely through said bodies and having reverse threads, and nuts on said screw outside of said bodies, the aforesaid parts being constructed and arranged so that when said screw is rotated said nuts shall force said bodies into more or less close contact against the elastic or resilient resistance of said supports.

10. In an electrical instrument and in circuit, two conducting-bodies, one being of high resisting material, each of said bodies being disposed at the free end of a leaf-spring, by means of which springs they are normally held out of contact, and means positively acting upon said bodies to force them into contact and to vary their mutual pressure.

11. In an electrical instrument and in circuit, a body of high resisting material, a body

of conducting material, each of said bodies being disposed at the free end of a rigidly-held leaf-spring, by means of which spring they are normally held out of contact, an independently-supported screw having reverse threads passing loosely through said bodies, and nuts on said screw outside of said bodies, the aforesaid parts being constructed and arranged so that when said screw is rotated said nuts shall force said bodies into more or less close contact against the elasticity of said springs.

12. The combination, in an electrical instrument and in circuit, of the annular disks 10, the carbon plates 11 thereon, leaf-spring supports 9 for said disks rigidly fastened at their extremities, the independently-supported screw 16, having reverse threads passing through said disks, and nuts 17 18 on said screw outside of said disks and bearing thereon.

13. The combination, in an electrical measuring-instrument and in circuit, of the rigidly-supported arms 6 and 12, blocks 8, carried by said arms, springs 9, carried by said blocks, annular disks 10 11, supported on said springs, independently-supported screw 16, passing through said disks and having reverse threads, and nuts 17 18 on said screw and outside of and bearing upon said disks.

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