

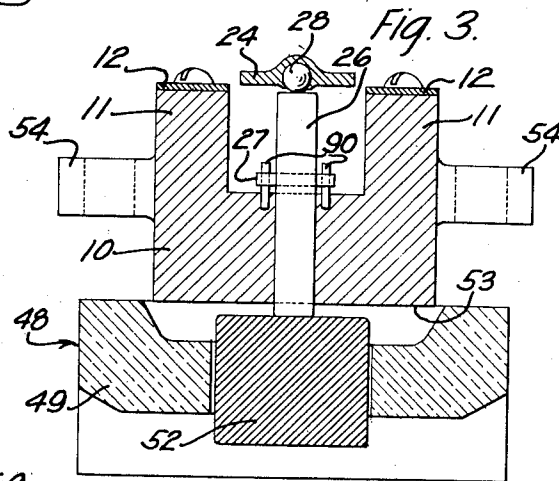
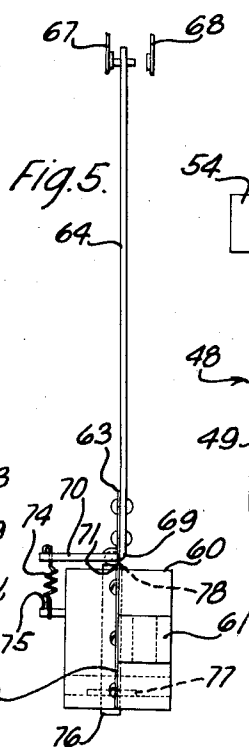
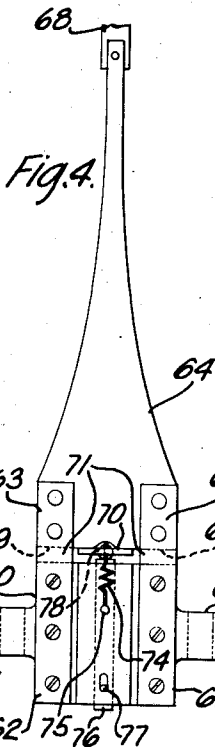
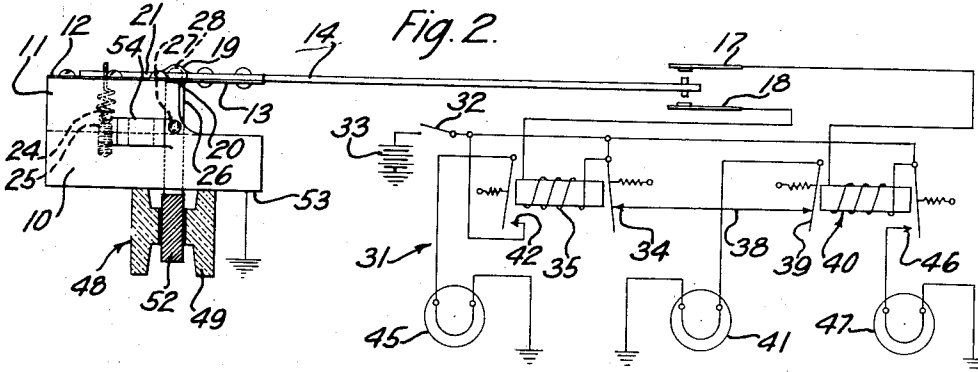
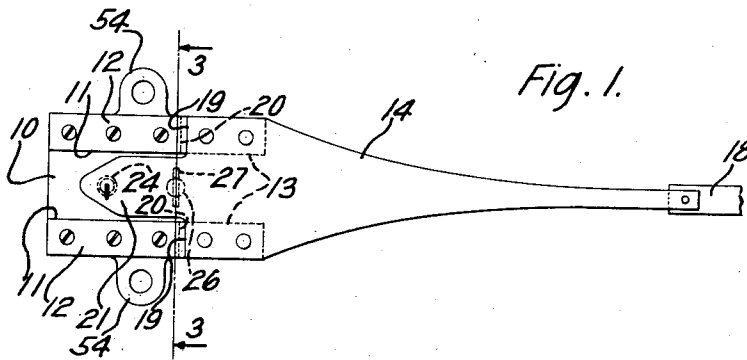
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J. L. ALDEN

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GAUGING APPARATUS

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Inventor  
John L. Alden  
By *N. J. Alden* Att'y

## UNITED STATES PATENT OFFICE

JOHN LESLIE ALDEN, OF LA GRANGE, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

## GAUGING APPARATUS

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This invention relates to gauging apparatus, and more particularly to resiliently supported gauging apparatus.

The primary object of the invention is to provide a simple and efficient means for accurately gauging materials, adaptable for use under varying conditions and requiring a minimum amount of adjustment and replacement of parts to maintain the effective operation thereof.

In accordance with the general features of the invention there is provided in one embodiment thereof an elongated indicating or switching member having a free indicating portion at one end thereof which may, in addition to its indicating function, control electrical circuits, the other end of the member being supported by a plurality of reeds extending parallel to the length of the member and secured to a mounting block leaving a short spring hinge. A movable work engaging plunger is mounted in the supporting framework, and one end thereof bears against a ball member which engages an extension of the indicating or switching member at a point offset from the center line of the hinge formed by the reeds. In one form the plunger operates at right angles to the length of the member, while in another form the plunger operates in a direction parallel to the length of the member and the extension of the member is at right angles to its length.

Other objects and advantages of this invention will be more apparent from the following detailed description taken in connection with the accompanying drawing, in which

Fig. 1 is a plan view of one embodiment of the gauging apparatus of this invention;

Fig. 2 is a side view of the apparatus illustrated in Fig. 1 with a signaling circuit diagram shown in association therewith;

Fig. 3 is an enlarged vertical section taken on the line 3—3 of Fig. 1;

Fig. 4 is an elevation of another embodiment of the gauging apparatus of this invention, and

Fig. 5 is a side view of the apparatus illustrated in Fig. 4.

Referring now to the drawing wherein like reference numerals have been employed to designate similar parts throughout the several figures, and particularly to Figs. 1, 2 and 3, a horizontally extending framework 10 is provided with a pair of upwardly extending portions 11 at one end thereof. To the upper surface of each of the portions 11 is rigidly fixed a metallic reed 12, an end of which projects from the right end of the supporting portion and over the frame 10 as clearly shown in Fig. 2, providing a portion 13. Fixed to the upper surface of the portions 13 of the reeds 12 is an elongated metallic indicating or switching member 14, which spans the space between the resilient reed portions 13, the reeds extending in substantial alignment with the member to the frame 10. The right end of the switching member 14 is provided with oppositely extending contacts arranged in the operation of the gauging apparatus, which will be described hereinafter, to engage contact springs 17 and 18. The supporting ends of the springs 17 and 18 have been omitted from the drawing for the purpose of simplifying the disclosure. The left end of that portion of the member 14 which spans the portions 13 is narrowed by being formed sharply inwardly, as viewed in Fig. 1, indicated by the surfaces 19 which are spaced to the right of the right ends of the portions 11 of the frame 10, at which points the portions 13 overhang the frame. It will be obvious that the lengths of the reeds 12 between the right ends of the portions 11 and the surfaces 19 provide a pair of short spring hinges 20. A pair of lugs 54 are provided to serve as a convenient means for removably securing the frame upon any suitable support.

A narrow center extension 21 of the member 14 projects to the left from the hinges 20 between the reeds 12 beginning at the shouldered surfaces 19 and attached thereto is a tension spring 24 which constantly acts to urge the member 14 counterclockwise about the spring hinges 20 and thus move the free right end of the member into engagement with the contact spring 17. One end of the spring 24 is attached to a screw 25 threaded

into the frame 10. It will be apparent that the effectiveness of the spring 24 in causing the member 14 to be biased toward the contact spring 17 may be controlled by slightly adjusting the screw 25 so as to subject the spring to more or less tension as desired. Positioned directly beneath the extension 21 of the member 14 is a plunger 26 which is slidable within the frame 10 and to prevent the downward dislodgment of the plunger from the frame 10 a horizontal pin 27 is fitted in the plunger (Fig. 3). A pair of vertical pins 90 secured in the frame 10 engage the projecting ends of pin 27 to prevent the rotation of the plunger 26. The extension 21 of the member 14 is fitted upon its under surface with a ball 28 which serves as a bearing point for the upper end of the plunger 26. It will be observed, referring to Figs. 1 and 2, that the plunger 26 bears against the extension 21 of the member 14 by means of the ball 28 at a point slightly offset from the line of the spring hinges 20, thus forming a short lever arm.

From the foregoing it is to be understood that upon a slight upward vertical movement of the plunger 26 the right end of the indicating member 14 will experience a magnified or relatively great swinging movement about the spring hinges 20 tending to cause an engagement of the end of the member 14 with the spring contact 18. Also upon the plunger 26 moving downwardly the spring 24 will act to maintain engagement of the ball 28 with the plunger and thus cause a reverse movement of the member 14 about the hinges 20 and tending to cause an engagement of the member with the spring contact 17. The contacts 17 and 18 are connected with suitable signaling circuits indicated generally by the numeral 31 (Fig. 2) and may be adjusted in any suitable manner toward or from the switching member to vary the limits of movement at which they are effective.

The signaling circuits 31 are representative of a few of a large number of signaling or control circuits which might be employed to indicate the results obtained by using the gauging apparatus just described. When the indicating or switching member 14 occupies the position shown in Fig. 2 free from engagement with either of the contact springs 17 and 18, a circuit will be completed which extends from one terminal of a battery or other source of electrical supply 33 having the other terminal thereof connected to ground, through a normally closed contact 34 of an electromagnet or relay 35, a conductor 38, a normally closed contact 39 of an electromagnet or relay 40, and thence through a signaling lamp 41 to ground. Likewise, when the member 14 is moved downwardly at its right end (Fig. 2) into contact with the contact spring 18 in response to an upward movement of the plunger 26, the circuit just

described will be opened and a circuit will be closed, which may be traced from ground through the frame, the member 14, the contact spring 18, the coil of the electromagnet 35, the switch 32 and to the battery 33. The electromagnet 35 is thus energized, opening its contact 34 to open the circuit including the lamp 41, which is thereupon extinguished, and closes its contact 42 to establish a circuit for a signaling lamp 45. When the member 14 is moved upwardly at its right end into contact with the spring 17 in response to the action of the spring 24 upon the plunger 26 moving downwardly, a circuit will be closed extending from ground through the frame, the member 14, the contact spring 17, the coil of the electromagnet 40, the switch 32, and to the battery 33. The electromagnet 40 is thus energized, opening its contact 39 to interrupt the circuit including and thus extinguishing the lamp 41. A contact 46 is also closed to complete a circuit for a signaling lamp 47.

The operation and application of the hereinbefore described gauging apparatus will be more readily appreciated when the apparatus is considered in connection with the gauging of work, for example, the gauging of protector block air gaps. A protector block 48 (Figs. 2 and 3) is representative of a block commonly employed in telephone circuits as a means for protecting against abnormal current surges within the circuits. This block 48 includes a porcelain block 49 and a carbon block or insert 52 fitted therein. The carbon insert 52 must be very accurately positioned within the block 49, the upper surface of the carbon block 52 being depressed below the upper surface of the porcelain block 49 within the limits of a few thousandths of an inch. This degree of depression represents the size of the open space air gap formed between the depressed surface of the carbon electrode insert or block 52 and a second electrode or block of conducting material, such as carbon (not shown) against which the upper surface of the porcelain block 49 is positioned. Referring to Fig. 3 it will be observed that a lower surface 53 of the gauging frame 10 assumes the position normally occupied by the surface of the before mentioned carbon electrodes used with protector blocks of the type disclosed, and thus when the block 49 is carried in any suitable manner into association with this lower surface 53, as clearly shown in Figs. 2 and 3, the upper surface of the carbon insert 52 will be carried into association with the lower extremity of the plunger 26. The distance between the lower surface 53 of the frame 10 and the upper surface of the carbon insert 52 will represent the size of the aforementioned air gap.

In the event that the air gap is less than the requirements, in other words, the upper

surface of the carbon insert 52 is positioned at a higher level than it should be within the frame 10 to provide the required air gap, the plunger 26 will be moved upwardly and acting upon the short lever arm, previously mentioned, cause the indicating or switching member 14 to be swung downwardly at its right end into contact with the spring 18 and the signaling lamp 45 will be energized. Likewise, in the event that the plunger 26 is not engaged by the carbon insert 52, as a result of an air gap greater than the requirements, the switching member 14 will remain in its normal position in contact with the spring contact 17, which contact is maintained through the action of the tension spring 24 and thus the signaling lamp 47 will be illuminated. In the event that the distance between the upper surface of the carbon insert 52 and the lower surface 53 of the frame 10 falls within the required limits, the plunger 26 will be moved to a position where the member 14 will in turn be moved so as to be maintained free from contact with either of the spring contacts 17 or 18 and the signaling lamp 41 will be energized.

In the gauging apparatus hereinbefore described and illustrated in Figs. 1, 2 and 3 it will be noted that the plunger 26 operates at right angles to the length of the member 14, which in some instances may be particularly advantageous, while in other cases an apparatus wherein the plunger operates in a direction parallel to the length of the member would be advantageous.

In Figs. 4 and 5 is illustrated a gauging apparatus of the latter mentioned type and forming another embodiment of this invention. A vertically extending base frame 60 is provided with a pair of laterally extending portions 61 having lugs, to each of which is fixed a vertical reed 62 having a portion 63 projecting above the upper surface of the frame. Fixed to the resilient reed portions 63 and spanning the space therebetween is a vertical indicating or switching member 64 very similar to the indicating or switching member 14 hereinbefore described and arranged to engage at its extreme upper end a pair of contact springs 67 and 68 in a manner similar to that of the member 14.

The lower end of the member 64 is narrowed, beginning at a point spaced a short distance above the upper end of the frame 60 and along the resilient reed portions 63, as is indicated by the surfaces 69 and terminates in a right angled extension 70 projecting freely between resilient reed portions 63. In a manner similar to that of the apparatus illustrated in Figs. 1, 2 and 3 the lengths of the reeds 62 between the upper surface of the frame 60 and the surfaces 69 provide a pair of short spring hinges 71. Attached to the free end of the extension 70 is one end of a tension spring 74, the opposite end there-

of being secured to and adapted to be wrapped around a tapered pin 75 fitted within the frame 60. It will be apparent that the effectiveness of the spring 74 in causing the member 64 to be biased toward the contact spring 67 may be readily controlled by adjusting the pin 75.

A slidable plunger 76 is mounted in the frame 60 directly below the extension 70 of the member 64, the plunger 76 being reciprocally mounted in the frame by means of a pin 77 fitted in the plunger with opposite projecting ends of the pin entered in a slot provided in the frame. At its upper end the plunger 76 is adapted to bear upon a ball 78 fitted into the lower surface of the extension 70. In a manner similar to that of the plunger 26 and the extension 21 of the indicating or switching member 14, which engage at a point slightly offset from the center line of the spring hinges 20, as shown in Figs. 1, 2 and 3, to form a short lever arm, the plunger 76 bears against the extension 70 of the member 64 by means of the ball 78, only at a point slightly spaced from the left face of the spring hinges 71, thus forming a short lever arm.

A description of operation of the latter described apparatus is not deemed necessary since it is obvious that it may be applied to the gauging of articles and associated with signaling or control circuits in a manner similar to that of the gauging apparatus illustrated in Figs. 1, 2 and 3.

From the foregoing it will be obvious that the several described embodiments of the gauging apparatus, which are simple in construction, have a very practical application in instances where it is desired to accurately gauge work within close limits and to clearly indicate the results or determinations of such gauging apparatus. The mounting of the indicating or switching members 14 and 64 by means of the spring hinges 20 and 71, respectively, presents an arrangement having a theoretical pivot which eliminates the necessity of adjustment and replacement of parts which are normally incident to the use of gauging apparatus which employ the conventional types of bearings, pivots, knife edges and the like. Thus, by employing this invention the necessity for adjustment and replacement of cooperating parts is reduced to a minimum, the positive actuation of an indicating or switching member is insured and a clearly visible indication of results in making gauging determinations within very close limits may be readily effected.

Although the invention as herein illustrated and described in connection with an apparatus for gauging of protector blocks and the like and provided with particular types of electrical signaling circuits, it should be understood that the novel features thereof are capable of other applications. There-

fore, the invention should be limited only by the scope of the appended claims.

What is claimed is:

1. In a gauging apparatus, a frame, an indicating member, a plurality of spaced resilient members secured to the indicating member and to the frame to form a resilient pivotal mounting for the indicating member, said indicating member having a free portion extending in one direction from the pivotal mounting and an extension extending in the other direction from the pivotal mounting, resilient means interposed between the extension and the frame to urge the indicating member to rotate about the pivotal mounting, and work engaging means contacting with the indicating member between the resilient means and the pivotal mounting.

2. In a gauge, a frame member comprising a pair of spaced supporting portions, resilient members secured to the supporting portions and having portions extending therebeyond, an indicating member secured to said extending portions at positions spaced from the supporting portions, the intervening portions of the resilient members serving as a pivot for the indicating member, said indicating member having an extension positioned between the supporting portions, resilient means extending between the extension and the frame member to urge the indicating member to rotate about said pivot, means for adjusting the resilient means, and work engaging means positioned to contact with the extension to cause deflection of the indicating member.

3. In a gauging apparatus, a support, an elongated indicating member, a resilient member securing said indicating member to said support, said members being substantially parallel, and a gauge member movable transversely to the axis of the indicating member and engaging the indicating member at one side of the point of flexure of said resilient member.

4. In a gauging apparatus, a frame, an indicating member, a resilient member secured to the indicating member and to the frame to form a resilient pivotal mounting for the indicating member, said indicating member having a free portion extending in one direction from the pivotal mounting, and an extension extending in the other direction from the pivotal mounting, resilient means interposed between the extension and the frame to urge the indicating member to rotate about the pivotal mounting, and work engaging means contacting with the indicating member between the resilient means and the pivotal mounting.

In witness whereof, I hereunto subscribe my name this 20th day of December A. D., 1928.

JOHN LESLIE ALDEN.