Jan. 10, 1933. L. I. DENNISON ET AL 1,894,025

GAUGING APPARATUS

Filed Dec. 15, 1927

Fig. 1.

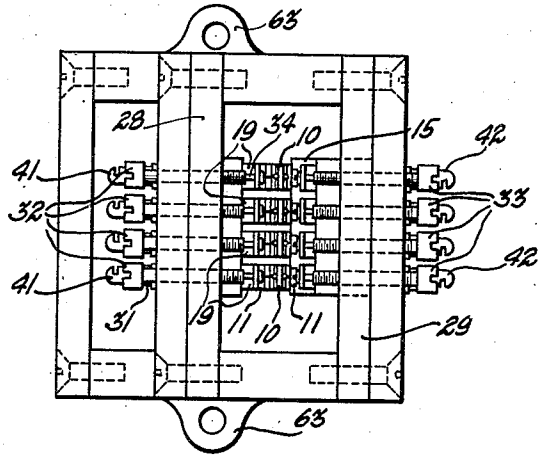


Fig. 3

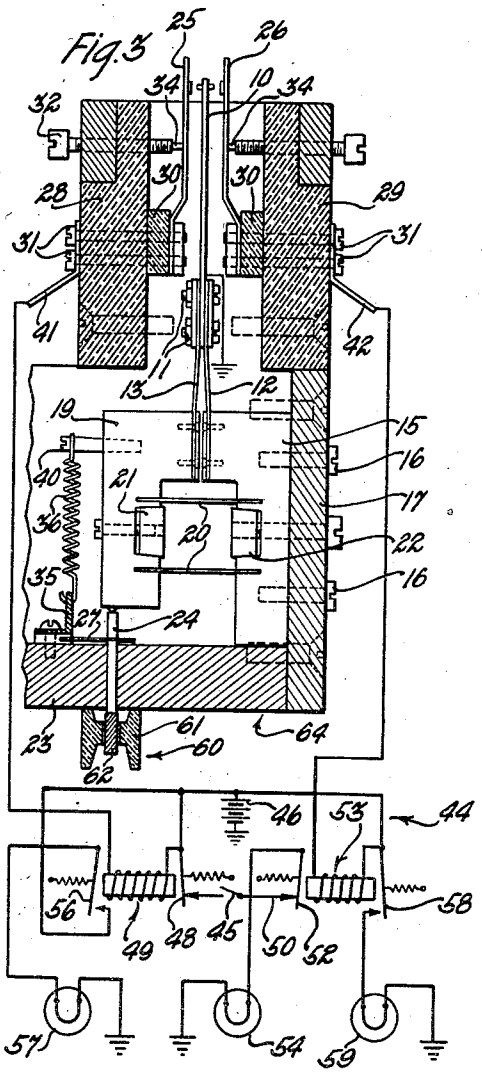
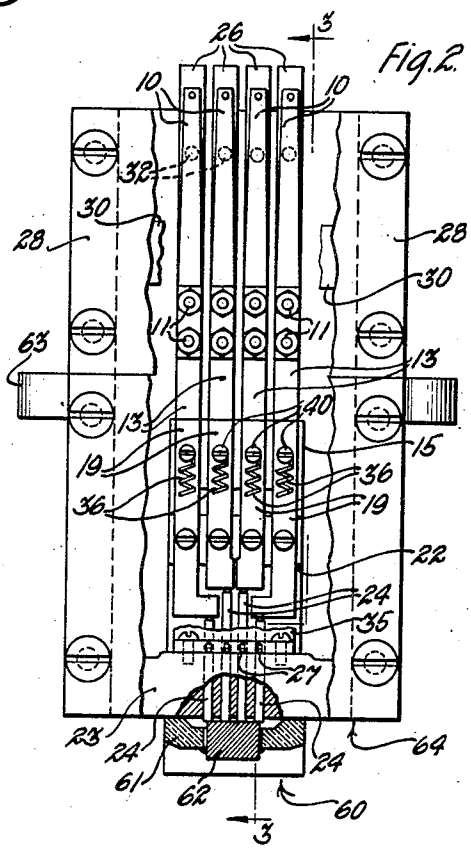


Fig. 2.



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Patented Jan. 10, 1933

1,894,025

UNITED STATES PATENT OFFICE

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GAUGING APPARATUS

Application filed December 15, 1927. Serial No. 240,222.

This invention relates to gauging apparatus, and more particularly to spring supported gauging devices included within electrical signaling circuits.

The primary object of the invention is to provide a simple and efficiently operable means for accurately gauging materials 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, one embodiment thereof includes a switch member mounted upon a pair of upright spring members, one of which is rigidly secured at its lower extremity to a fixed block so as to present a flexible pivot or hinge. The other spring is secured to a resiliently supported actuating member adapted to be moved by work engaging plungers. A slight movement of the plungers results in a magnified swinging movement of the free end of the switching member about a theoretical pivot and signaling circuits containing contact springs operatively associated with the switching member are effected in accordance with the movement experienced by the work engaging plungers. Thus the invention presents an efficiently operable spring supported switching means and associated gauge mechanisms for positively and accurately performing gauging operations.

These and other objects will be more apparent from the following detailed description when considered in connection with the accompanying drawing, wherein

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

Fig. 2 is a side elevational view of the apparatus disclosed in Fig. 1 with a protector block associated therewith, a portion of the insulating and casing plates thereof being broken away to more clearly disclose the operating characteristics of the resiliently supported switching means, and

Fig. 3 is a transverse vertical sectional view taken on the line 3—3 of Fig. 2 with a signaling circuit diagram shown in association therewith.

Referring now to the drawing wherein like numerals have been employed to designate similar parts throughout the various figures, it will be observed that a gauging apparatus is disclosed which includes a plurality of adjacent, vertically, positioned switching members or strips 10 of metallic construction, the lower ends of which are secured by means of clamping screws 11 to the upper extremities of pairs of resilient metallic members or springs 12 and 13. The springs 12 are secured at their lower extremities to a block 15 (Fig. 3) which is rigidly secured by means of suitable screws 16 to a vertical plate 17 which forms a part of the housing or casing for the switching means. The lower end of each of the springs 13 is suitably secured to a movable gauge block 19 and this gauge block is resiliently supported or floated at the extremities of a pair of parallel springs 20. One extremity of each of the springs 20 is clamped within the movable block 19 by means of a wedge block 21 and the other extremity of each of the springs is similarly clamped within the fixed block 15 by means of a wedge block 22. The portions of the movable block 19 between the wedge block and slits for receiving the extremities of the springs 20 are resilient and hence by tightening screws threaded within each of the wedge blocks 21 and 22, the springs 20 will be firmly clamped in position by the above mentioned resilient portions of the block 19. From the foregoing it is to be understood that upon a slight vertical movement of the gauge block 19, the upper end of the switching member 10 will experience a magnified or relatively great swinging movement about a theoretical pivot within the supporting spring 12. Thus by upwardly moving plungers 24 positioned directly beneath each of the gauge blocks 19 and slidable within a base plate 23, the switching member 10 will be swung to the right (Fig. 3) between a pair of contact springs 25 and 26, and to prevent the downward dislodgement of the plungers 24 from the base, a horizontal pin 27 is fitted within each plunger with one extremity of each pin sheathed or guided within an anchor member 35.

These contact springs 25 and 26 are similar in design and are suitably clamped to insulating panels 28 and 29, respectively, and upon insulating strips 30 by means of screws 31. Adjusting screws 32 and 33 having insulated tips 34 are employed to engage and properly position the contact springs 25 and 26 with respect to the switching member 10 positioned therebetween. The switching members 10 are constantly urged to the left (Fig. 3) toward the contact springs 25 by means of coiled springs 36 which are interposed between the anchoring member 35 mounted upon the base 23 and tapered pins 40 fitted within the gauge blocks 19. The upper extremities of the coiled springs 36 are secured to and adapted to be wrapped about the pins 40 when a counter-clockwise turn (Fig. 2) is imparted to the pins. Thus it will be clear that the effectiveness of the springs 36 in causing the switching members 10 to be biased toward the contact springs 25 may be controlled by slightly turning the pins 40 so as to subject the springs 36 to more or less tension as desired. The screws 31 also serve to secure terminal members 41 and 42 in position against the insulating panels 28 and 29, respectively, and these terminal members are connected with suitable signaling circuits indicated generally by the numeral 44 (Fig. 3).

The signaling circuits 44 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 apparatus just described. When the switching member 10 occupies the position shown in Fig. 3 free from engagement with either of the contact springs 25 or 26 and a switch 45 is closed, a circuit will be completed which extends from one terminal of a battery or other source of electrical supply 46 having the other terminal thereof connected to ground, through a normally closed contact 48 of an electro-magnet or relay 49, a conductor 50 including the switch 45, a normally closed contact 52 of an electro-magnet or relay 53 and then through a signaling lamp 54 to ground. Likewise when the switch member 10 is moved to the left (Fig. 3) into contact with the spring 25, the circuit just described will be opened and a circuit will be closed which may be traced from ground through the switch member 10, the contact spring 25, the terminal 41, the coil of the electro-magnet 49, and to the battery 46. The electro-magnet 49 is thus energized opening its contact 48 to open the circuit including the lamp 54 which is thereupon extinguished and closes its contact 56 to establish an illuminating circuit for a signaling lamp 57. When the switch member 10 is moved into contact with the spring 26 in response to the upward movement of the plunger 24, a circuit will be closed extending from ground through the member 10, the contact spring 26, the terminal 42, the coil of the electro-magnet 53, and to the battery 46. The electro-magnet 53 is energized opening its contact 52 to interrupt the circuit containing and thus extinguishing the lamp 54. A contact 58 is also closed to complete a circuit for illuminating a signaling lamp 59. From the foregoing it will be apparent that each of the switching members 10 and the companion parts may be connected within signaling circuits in the manner just described and each switching member 10 may be employed to operate independently of the other switching members. Apertured lugs 63 extending laterally from the apparatus casing provide a convenient means for removably attaching the gauging device to any suitable support or fixture.

The operation and application of the described gauging apparatus will be more readily appreciated when the apparatus is considered in connection with the gauging of protector block air gaps. A protector block 60 (Figs. 2 and 3) is representative of a block commonly employed in telephone circuits as a means for protecting against abnormal current surges within said circuits. This block 60 includes a porcelain block 61 and a carbon block or insert 62 fitted therein. The carbon insert 62 must be very accurately positioned within the block 61, the upper surface of the carbon block 62 being depressed below the surface of the porcelain block 61 within the limits of a few ten-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 or block and a second electrode or block of conducting material such as carbon (not shown) against which the surface of the porcelain block is positioned. Referring to Fig. 2 it will be observed that a lower surface 64 of the base 23 assumes the position normally occupied by the surface of the above mentioned carbon electrodes used with protector blocks of the type disclosed, and thus when the block 60 is carried in any suitable manner into association with this lower surface of the base 23 as clearly shown in Figs. 2 and 3, the upper surface of the carbon insert 62 will be carried into association with the lower extremities of the plungers 24. The distance between the lower surface 64 of the base 23 and the upper surface of the carbon insert 62 will represent the size of the above mentioned air gap. In the event that a raised portion is present upon the surface of the carbon insert 62, the plunger 24 associated with that portion of the insert will be moved upwardly so as to cause the switch member 10 to be swung to the right (Fig. 3) into contact with the spring 26 and the signal lamp 59 will be energized. Likewise in the event that a plunger is not engaged by the carbon insert 62, as a result of a low portion in the insert surface, the switching member 10 com-

panion to the plunger will remain in its normal position in contact with the spring 25, which contact is maintained through the action of the coil spring 36 and thus the signaling lamp 57 will be energized. Likewise in the event that the distance between a portion of the upper surface of the carbon insert and the surface 64 of the base 23 falls within the required limits, the switching member 10 companion to the plunger engaging this surface portion will be moved so as to be maintained free from contact with either of the springs 25 or 26 and the signaling lamp 54 will be energized.

Obviously the lamps included within the described circuits might have bulbs of different colors to enable an operator to more readily ascertain the gauging results. By having a plurality of plungers 24 as described which cooperate to gauge the entire upper surface of the carbon insert 62, a lamp coloring scheme might be employed to readily apprise an operator of the results obtained by each plunger. Thus a display of the colors of the lamps 57 would clearly indicate the presence of an oversized air gap, while the color of the lamp 54 would indicate the presence of an air gap within required limits and likewise the lamp 59 would indicate the presence of an undersized gap. It will be apparent that the switch members 10 may be associated with various types of control circuits which operate in response to the movement of the gauging plungers as described.

From the foregoing it will be readily understood that the described gauging apparatus has a very practical application in instances where it is desired to accurately gauge parts within close limits and to clearly indicate the results or determinations of such gauging operations. The resilient mounting for the switching members 10 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 is provided with conventional types of bearings, pivots, knife edges and the like. Thus by employing this invention, the necessity for adjustment and replacement of co-operating parts is reduced to a minimum, the positive actuation of a switching member is insured and a clearly visible indication of results obtained in making gauging determinations within very close limits may be readily effected.

Although the invention has been described in connection with an apparatus for use with the gauging of protector blocks and the like and provided with particular types of electrical signaling circuits, it is to be understood that the invention is capable of many other applications and therefore should be limited only by the scope of the appended claims.

What is claimed is:

1. In a gauging apparatus, a plurality of work engaging members arranged for contemporaneous engagement with a plurality of adjacent points of the work to be gauged, the extremities at one end of the members being arranged in pairs disposed in a plurality of planes, a plurality of movable means corresponding in numbers and pairs to the said members with the extremities thereof disposed in a plurality of planes for engagement respectively with the aforesaid extremities of the said members and responsive to the actuation of the members because of any variations in the work being gauged, a fixed element, a plurality of indicating members, resilient means for connecting the indicating members to the movable members, and resilient means for connecting the indicating members to the fixed element whereby the indicating members may be actuated independently in response to the movement of said work engaging members.

2. In a gauging apparatus, a work engaging member, a movable member responsive to the actuation of said work engaging member because of any variation in the part being gauged, a stationary member, an indicator, means for movably securing said indicator to said stationary member, means operatively connecting said indicator to said movable member, resilient members for connecting said movable member to said stationary member, whereby an arcuate movement may be imparted to said movable member for moving said indicator when said work engaging member is actuated, gripping means for securing said resilient members in place, said griping means comprising resilient jaws, and means for moving said resilient jaws in close engagement with said resilient members.

3. In a gauging apparatus, a work engaging member, a movable member responsive to the actuation of said work engaging member because of any variation in the part being gauged, a stationary member, an indicator, means for movably securing said indicator to said stationary member, means operatively conecting said indicator to said movable member, resilient members for connecting said movable member to said stationary member, whereby an arcuate movement may be imparted to said movable member for moving said indicator when said work engaging member is actuated, gripping means for securing said resilient members in place, said gripping means comprising resilient jaws, and wedge blocks for moving said resilient jaws in close engagement with said resilient members.

4. In a gauging apparatus, a plurality of work engaging members positioned in close proximity to each other, a plurality of movable members, some having transversely extending portions extending beneath others,

whereby they may be operatively associated respectively with the closely positioned work engaging members for gauging closely positioned points of the work, and indicators operatively connected to said movable members for indicating any variations in the work being gauged.

5. In a gauging apparatus, an L-shaped fixed member, an L-shaped movable member, two arms of said L-shaped members being directed toward each other and having their ends closely adjacent each other, a pair of leaf springs interconnecting the other two arms of the L-shaped members to maintain them parallel, a pair of leaf springs, one of which is attached to each of the adjacent ends of the L-shaped members, the other ends of the leaf springs attached to said adjacent ends of the L-shaped members being rigidly interconnected, and an arm attached to said interconnected ends of the springs.

6. In a gauging apparatus, a fixed member, a movable member, a pair of springs interconnecting said members, said members having portions extending into close proximity to each other, springs each attached at one end only to one of said portions and projecting in substantial parallelism therefrom, the free length of said last named springs being a multiple of the distance between them, and an arm carried by and connected with the free end portions of said last named springs.

7. In a gauging apparatus, a pair of relatively movable members, a pair of leaf springs interconnecting and spacing said members relative to each other, portions of said members extending into close proximity to each other, a pair of leaf springs each attached at one end to one of said portions and projecting freely therefrom, and an arm carried by and connected with the free end portions of the ends of said last named springs, the free length of said last named springs being a multiple of the distance between the springs.

In witness whereof, we hereunto subscribe our names this 29th day of November, A. D. 1927.

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CHARLES FREDERICK DREYER.