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C. B. EMERY ET AL

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GAUGING APPARATUS

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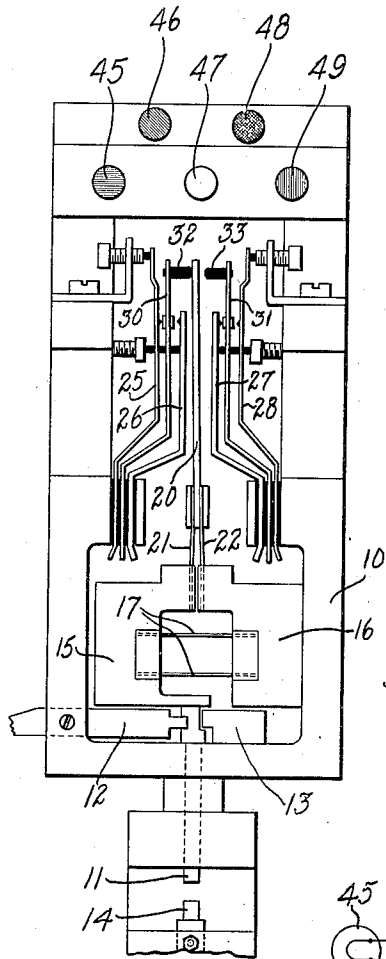


Fig. 1

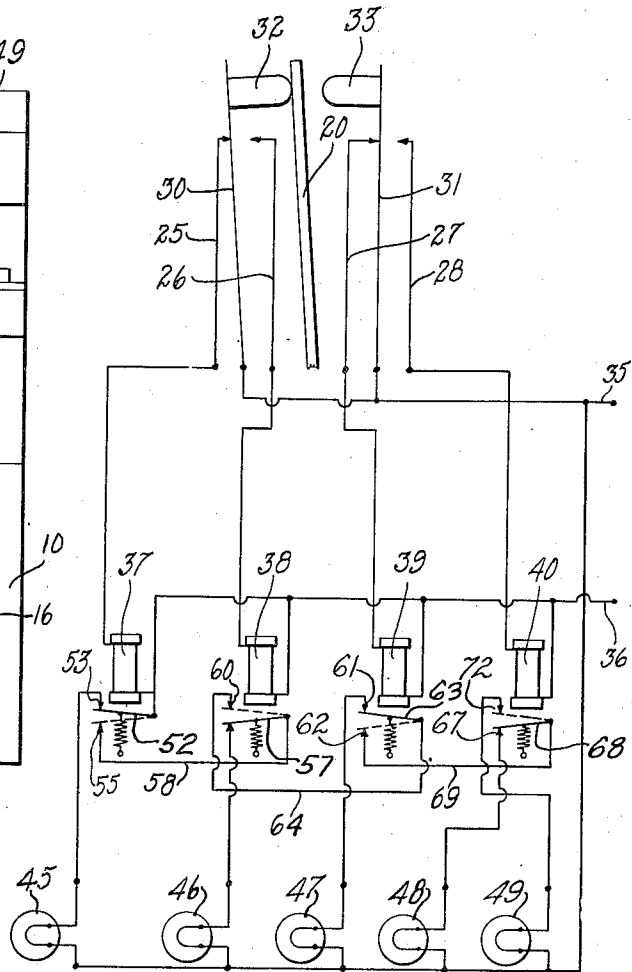


Fig. 2

Inventors
C. B. Emery
A. W. Schoof
by H. G. Whitehorn Att'y.

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GAUGING APPARATUS

Charles B. Emery, River Forest, and Arthur W. Schoof, Riverside, Ill., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

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2 Claims. (Cl. 177—351)

This invention relates to gauging apparatus, and its principal object is to provide a simple and efficient apparatus for gauging dimensions of articles and for indicating whether the gauged dimensions are within one or another of a plurality of limits.

One embodiment of the invention contemplates the provision of a gauging apparatus including an indicating system, wherein a pointer or switch controlling member movable in response to variations in dimensions of articles being gauged, controls a plurality of electrical contacts for selectively operating signaling means to indicate whether the gauged dimensions are within one or another of a series of limits. In a preferred form of the invention, the electrical contacts control the operation of a plurality of relays for selectively lighting a plurality of signaling lamps positioned where they will be readily and conveniently observed by an operator of the apparatus.

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

Fig. 1 is a front elevational view of a gauging apparatus, embodying the features of the invention, and

Fig. 2 is a schematic wiring diagram of the indicating system therefor.

Referring now to the drawing, numeral 10 designates a frame in the lower portion of which is provided an aperture for receiving a gauging element or plunger 11, movable vertically by a hand lever 12 and limited in its vertical movement by a stop member 13. The lower end of the gauging plunger 11 is normally positioned a predetermined distance from an anvil or article supporting member 14, while the upper end has disposed in engagement therewith a movable element 15. The movable element 15 is connected by reeds or flat springs 17 to a stationary element 16 fixed to the frame 10, whereby the movable element 15 is allowed to move with the gauging plunger 11, which movement may be caused by the insertion of an article to be gauged between the gauging plunger and the anvil 14. A pointer or switch controlling member 20 is connected at one end to the inner and upper portion of the movable element 15 and the stationary element 16 by means of flat springs 21 and 22, respectively. Due to the construction just described a magnified swinging movement is imparted to the upper end of the switch controlling member 20 by a movement of the gauging plunger 11, the extent

of movement of the member depending upon the extent of movement of the plunger.

A pair of spaced resilient contacts 25 and 26 are positioned on the left side of the switch controlling member 20 and resilient contacts 27 and 28 are positioned on the right side thereof. The switch controlling member 20 is associated with resilient switch members 30 and 31, the switch member 30 being positioned between the resilient contacts 25 and 26 and having an insulating pin 32 fixed to the upper end thereof and arranged to be engaged by the upper end of the switch controlling member 20 when moved to the left (Fig. 1), while the resilient switch member 31 is positioned between the resilient contacts 27 and 28 and provided with an insulating pin 33 at the upper end thereof arranged to be engaged by the upper end of the switch controlling member 20 when moved to the right.

Referring to Fig. 2, it will be observed that the switch members 30 and 31 are connected to one lead 35 of a source of electrical energy (not shown) the other lead of which is indicated by the numeral 36. The contacts 25, 26, 27 and 28 are connected to the lead 36 through the windings of relays 37, 38, 39 and 40, respectively. These relays are arranged to selectively control the actuation of a plurality of signaling elements, such as lamps 45, 46, 47, 48 and 49 positioned where the operator of the gauging apparatus may readily observe them, as shown in Fig. 1.

An armature 52 of relay 37 is connected to the lead 36. A normally open contact 53 of relay 37 is connected through the lamp 45 to the lead 35, and a normally closed contact 55 of this relay is connected by a conductor 58 to an armature 57 of relay 38. A normally closed contact 56 of relay 38 is connected through the lamp 46 to the lead 35, and a normally open contact 60 of this relay is connected by a conductor 64 to an armature 63 of relay 39. A normally open contact 61 of relay 39 is connected through the lamp 47 to the lead 35, and a normally closed contact 62 of this relay is connected by a conductor 69 to an armature 68 of relay 40. A normally closed contact 67 of relay 40 is connected through the lamp 48 to the lead 35, and a normally open contact 72 of this relay is connected through the lamp 49 to the lead 35.

From the above described circuit arrangement, it will be understood that the signaling lamps 45 to 49, inclusive, are selectively energized by the operation of the relays 37 to 40, inclusive. The relays, in turn, are selectively energized by the engagement of the switch members

30 and 31 with their associated contacts 25, 26 and 27, 28, respectively, which engagement is controlled by the position of the switch controlling member 20. In the present embodiment of the invention the switch members 30 and 31 are tensioned to normally engage contacts 26 and 27, respectively, that is, when the switch controlling member 20 is not in pressing engagement with either of the switch members.

When no article is positioned between the anvil 14 and the gauging plunger 11, the switch controlling member 20 is swung to the left to the position shown in the drawing due to the movement of the plunger 11 and element 15 to their lowermost positions caused by the force of gravity. With the member 20 in this position, the switch members 30 and 31 are disengaged from contacts 26 and 28 and engaged with contacts 25 and 27, respectively. By referring to Fig. 2, it will be seen that this condition results in the energization of relays 37 and 39, while relays 38 and 40 are not energized, whereby contacts 53, 56, 61 and 67 of relays 37, 38, 39 and 40, respectively, are closed while the other contacts of these relays are opened. Thus, an electrical circuit is completed through the signaling lamp 45, as follows: from line 35 through lamp 45, contact 53 of relay 37 and armature 52 of same relay to line 36. However, the operating circuits of lamps 46, 47, 48 and 49 will not be completed due to the open relay contacts 55, 60, 62 and 72. Therefore, the lamp 45 is illuminated while the others are not.

The operation of the apparatus is as follows: The gauging plunger 11 is manually lifted by means of the hand lever 12 to permit the insertion of an article to be gauged between the anvil 14 and the lower end of the gauging plunger, after which the hand lever is released, permitting the gauging plunger to move downwardly toward the article. If the dimension of the article being gauged is below a predetermined low limit, as determined by the normal distance between the end of the gauging plunger and the upper surface of the anvil 14, the plunger will move to its lowermost position before engaging the article and thus the switch controlling member 20 is swung to the left sufficiently to cause the engagement of switch member 30 with contact 25, whereby the lamp 45 is illuminated, as described above, to indicate to the operator that the dimension of the article being gauged is below the predetermined limit.

If the dimension of an article being gauged is above the predetermined low limit but below a second predetermined limit, the position of the gauging plunger upon engaging the article will be such that the switch controlling member 20 will be swung to the left to a position wherein the switch member 30 will be moved sufficiently to cause its disengagement from the contact 26, but insufficiently to cause its engagement with the contact 25. When this condition exists, the relay 39 remains energized, but the other relays 37, 38 and 40 are not energized, whereby relay contacts 55, 56, 61 and 67 are closed while the other relay contacts are opened. Thus, an electrical circuit is completed through the lamp 46, as follows: from line 35 through lamp 46, contact 56 of relay 38, armature 57 of same relay, conductor 58, contact 55 of relay 37, and armature 52 of same relay to line 36. This results in the illumination of lamp 46 to indicate to the operator that the dimension of the article being

gauged is above the first but below the second predetermined limits.

If the dimension of an article being gauged is above the second predetermined limit but below a third predetermined limit, the switch controlling member 20 will assume a position wherein the tensioned switch members 30 and 31 are permitted to engage the contacts 26 and 27, respectively. This results in the energization of relays 38 and 39, while relays 37 and 40 are not energized, whereby relay contacts 55, 60, 61 and 67 are closed while the other relay contacts are opened. Thus, the electrical operating circuit of lamp 47 is completed as follows: from line 35, through lamp 47, contact 61 of relay 39, armature 63 of same relay, conductor 64, contact 60 of relay 38, armature 57 of same relay, conductor 58, contact 55 of relay 37, and armature 52 of same relay to line 36. Therefore, the lamp 47 is illuminated to indicate to the operator that the dimension of the article being gauged is above the second but below the third predetermined limits.

If the dimension of the article being gauged is above the third predetermined limit but below a fourth or high predetermined limit, the switch controlling member 20 will be swung to the right to a position wherein the switch member 31 will be moved sufficiently to cause its disengagement from the contact 27, but insufficiently to cause its engagement with the contact 28. This results in the energization of relay 38 while relays 37, 39 and 40 are not energized, whereby relay contacts 55, 60, 62 and 67 are closed while the other relay contacts are opened. Thus, the electrical operating circuit of lamp 48 is completed as follows: from line 35 through lamp 48, contact 67 of relay 40, armature 68 of same relay, conductor 69, contact 62 of relay 39, armature 63 of same relay, conductor 64, contact 60 of relay 38, armature 57 of same relay, conductor 58, contact 55 of relay 37, and armature 52 of same relay to line 36. The lamp 48 is thereby illuminated to indicate to the operator that the dimension of the article being gauged is above the third but below the fourth predetermined limits.

If the dimension of the article being gauged is above the fourth or high predetermined limit, the switch controlling member 20 will be swung to the right sufficiently to cause the switch member 31 to engage the contact 28. This results in the energization of relays 38 and 40 while relays 37 and 39 are not energized, whereby relay contacts 55, 60, 62 and 72 are closed while the other relay contacts are opened. Thus, the electrical circuit of lamp 49 is completed as follows: from line 35 through lamp 49, contact 72 of relay 40, armature 68 of same relay, conductor 69, contact 62 of relay 39, armature 63 of same relay, conductor 64, contact 60 of relay 38, armature 57 of same relay, conductor 58, contact 55 of relay 37, and armature 52 of same relay to line 36. The lamp 49 is thereby illuminated to indicate to the operator that the dimension of the article being gauged is above the fourth predetermined limit.

With the embodiment of the invention just described, the articles being gauged will be graded or classified into five grades. It may be desired to reject those in the first and fifth grades and to use only those in the second, third and fourth grades.

From the above description, it will be obvious that the present invention provides a simple and efficient apparatus for gauging dimensions of articles and for simultaneously indicating whether the gauged dimensions are within one or another

of a series of limits, below a predetermined low limit or above a predetermined high limit. It is apparent, of course, that the limits may be varied by simply changing the normal distance between the anvil 14 and the gauging plunger 11 and by adjusting the contacts 25 to 28, inclusive, as by means of the adjusting screws shown in Fig. 1. For example, if it is desired to determine whether the dimensions of articles being gauged are below .2", between .2" and .2001", between .2001" and .2002", between .2002" and .2003", or above .2003" the apparatus is constructed and/or adjusted so that the signaling lamps 45, 46, 47, 48 and 49 are selectively illuminated, in the manner described above, when the dimension of an article being gauged is below .2", between .2" and .2001", between .2001" and .2002", between .2002" and .2003" and above .2003", respectively. It is obvious that each of the lamps may be of a suitable color distinguishingly different from the others so that the operator may more readily determine the measurement of the article being gauged.

It is to be understood that the invention is not limited to the particular embodiment thereof herein illustrated and described, except as defined by the appended claims.

What is claimed is:

1. In a gauging apparatus, a movable element responsive to a dimension of an article being gauged, and means for indicating variations in the gauged dimension comprising four electrical relays each having a front contact and a back contact, a source of electrical current, an electrical indicating device connectible to said current source through the front contact of the first of said relays, a second indicating device connectible to said current source through the back contacts of the first and second of said relays, a third indicating device connectible to said current source through the front contacts of the second and third relays and the back contact of the first relay, a fourth indicating device connectible to said current source through the back contacts of

the first, third and fourth relays and the front contact of the second relay, and a fifth indicating device connectible to said current source through the front contacts of the second and fourth relays and the back contacts of the first and third relays and a plurality of electrical contact switches selectively actuated by said movable element according to the dimension of the article being gauged for selectively connecting said relays to said electrical current source.

2. In a gauging apparatus, four fixed contacts arranged in spaced apart pairs and with the contacts of each pair in spaced relation, two movable contacts, one between the fixed contacts of each pair for engaging either of said fixed contacts and normally engaging one of said contacts, a movable element movable between said movable contacts responsive to a dimension of an article being gauged for selectively engaging said movable contacts with the associated fixed contacts, four relays, one for each fixed contact, a source of electrical current connectible to said relays separately through the engagement of the movable contacts with the corresponding fixed contacts, each of said relays having a front contact and a back contact, an electrical indicating device connectible to said current source through the front contact of the first of said relays, a second indicating device connectible to said current source through the back contacts of the first and second of said relays, a third indicating device connectible to said current source through the front contacts of the second and third relays, and the back contact of the first relay, a fourth indicating device connectible to said current source through the back contacts of the first, third and fourth relays and the front contact of the second relay, and a fifth indicating device connectible to said current source through the front contacts of the second and fourth relays and the back contacts of the first and third relays.

CHARLES B. EMERY.
ARTHUR W. SCHOOF.