Sept. 21, 1954

W. L. FRY ET AL

GAUGING MECHANISM

2,689,409

Filed May 12, 1953

2 Sheets-Sheet 1

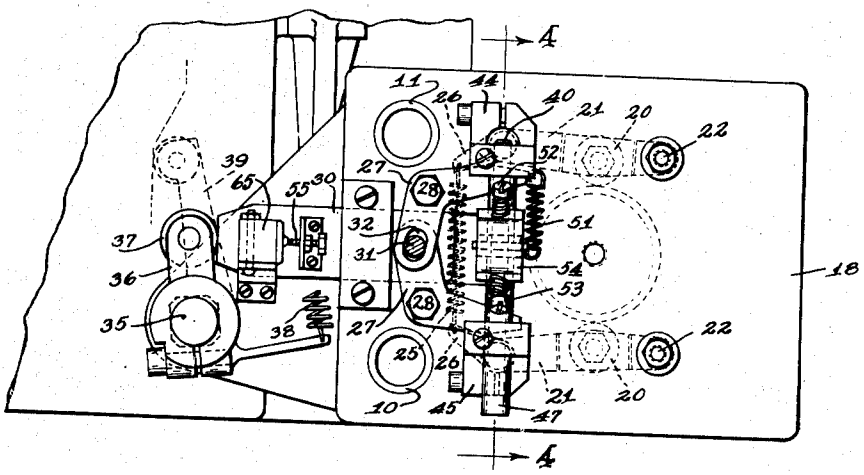


Fig. 2.

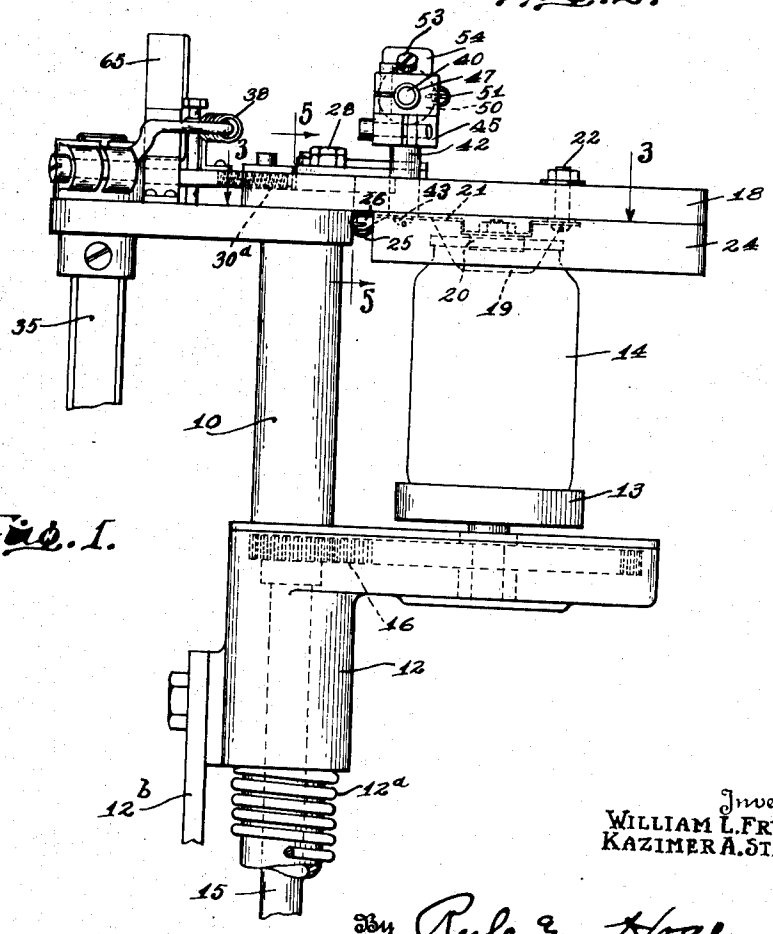


Fig. 1.

Inventors
WILLIAM L. FRY
KAZIMER A. STRZALA

By Rule and Hoge.

Attorneys

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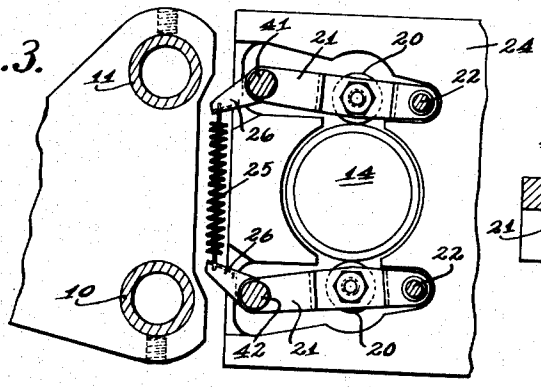
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Fig. 3.



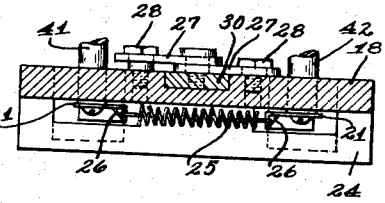


Fig. 5.

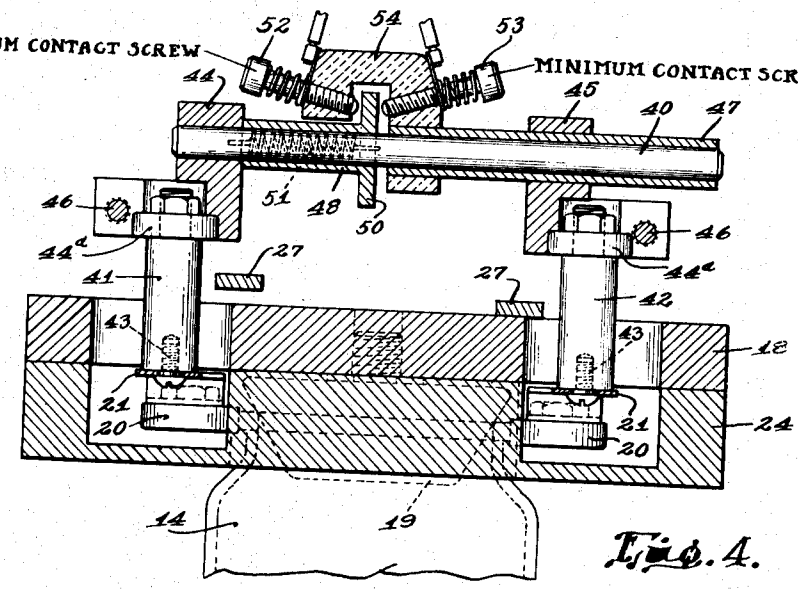


Fig. 4.

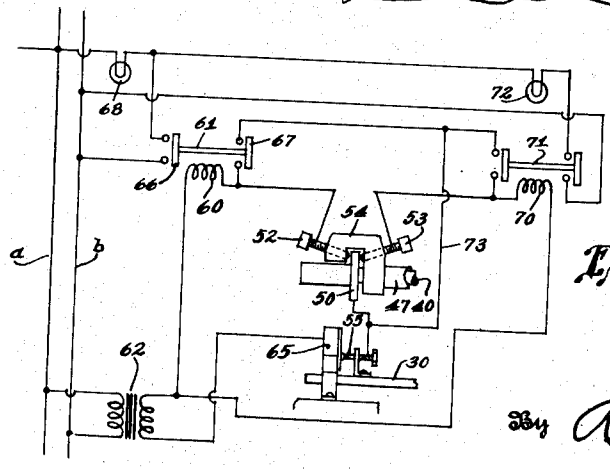


Fig. 6.

Inventors
WILLIAM L. FRY
KAZIMER A. STRZALA

By Rule and Hoge

Attorneys

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GAUGING MECHANISM

William L. Fry, Lafayette, and Kazimer A. Strzala, Walnut Creek, Calif., assignors to Owens-Illinois Glass Company, a corporation of Ohio

Application May 12, 1953, Serial No. 354,496

3 Claims. (Cl. 33—178)

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Our invention relates to apparatus for gauging various articles or surfaces for determining whether they come within predetermined maximum and minimum limits. The invention may be used in gauging the diameters of round articles and for gauging various other dimensions. As herein shown, the invention comprises certain improvements on the gauging machine disclosed in the patent to Fedorchak 2,327,629, August 24, 1943, Gauging Machine.

The invention comprises a pair of outer electric contact elements spaced apart with an intermediate contact element normally spaced from said outer elements. During the gauging operation the relative positions of the contact elements is determined by the dimensions of the article being gauged. The intermediate element is brought into contact with one of the outer elements if the dimension of the article is above the prescribed maximum and into contact with the other element if such dimension is below the prescribed minimum. An electrical contact thus made by either element operates to establish a circuit for electroresponsive means such as a signal lamp or other signalling device or for mechanism for segregating the defective articles from those which pass the test.

The invention provides improved means for maintaining adjustment of parts for accurately gauging articles and maintaining precise maximum and minimum tolerances throughout continuous operation and for extended periods. Various other features of novelty and utility will be apparent from the following detailed description.

Referring to the accompanying drawings:

Fig. 1 is an elevation of a portion of a gauging machine equipped with gauging mechanism comprising our invention;

Fig. 2 is a plan view of the same;

Fig. 3 is a sectional view at the line 3—3 on Fig. 1;

Fig. 4 is a sectional elevation at the line 4—4 on Fig. 2 on a somewhat larger scale;

Fig. 5 is a section at the line 5—5 on Fig. 1; and

Fig. 6 is a wiring diagram.

The gauging apparatus is mounted on a pair of vertical standards 10 and 11. A bracket 12, mounted for up and down sliding movement on the standards, carries a work holder or pad 13 which provides a support for articles 14 while they are being gauged. The pad 13 is journalled in the bracket for continuous rotation by means of a drive shaft 15 operably connected to the pad through gearing 16. The shaft 15 is motor

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driven as in the before mentioned Fedorchak patent. The bracket 12 is periodically moved upward by springs 12a and lowered by a cam operating through a link 12b in the manner disclosed in said patent.

Mounted on the standards 10 and 11 is a platform 18 to the underside of which is attached a frusto-conical downwardly tapered centering plug 19. The article 14 to be gauged, here shown as a jar, is placed on the pad 13 while the latter is in its lowered position. As the pad is moved upward the article is brought to gauging position and centered by the centering plug 19 which enters the open mouth of the jar. A pair of gauging rolls 20 are carried on gauging arms 21 pivoted to the platform 18 by pivot pins 22. A plate 24 attached to the undersurface of the platform 18 is recessed to receive the gauging levers 21 and the centering plug 19. A tension coil spring 25 is connected through lugs 26 to the free ends of the gauging levers 21 for holding the gauging rolls 20 in contact with the rim of the jar 14 during the gauging operation.

Means for holding the gauging rolls spread apart while the jar is being lifted into gauging position includes a pair of bell crank levers 27 mounted to swing about pivot pins 28 attached to the platform 18. The bell crank levers are actuated by a slide bar 30 which is mounted for horizontal reciprocating movement in a slideway formed in platform 18, the slide bar carrying a pin 31 extending through elongated slots 32 in the bell crank levers. The latter include arms extending forwardly between the gauging arms 21. When the slide bar 30 is moved forward it operates through the bell cranks and arms 21 to spread the gauging rolls 20 apart so that the jar 14 can move freely upward to gauging position coming in contact with the gauging rolls. When the slide bar 30 is retracted it swings the bell crank levers out of contact with the gauging arms 21.

Means for moving slide bar 30 forward includes a vertical rock shaft 35 to which is attached a rock arm 36 carrying a roll 37 which bears against the slide bar 30. The rock shaft 35 is rotated in one direction by a coil spring 38, and in the opposite direction by a rock arm 39 (Fig. 2) which may be actuated by a cam.

The gauging mechanism comprises a horizontal rod 40, herein referred to as a slide rod, having operative connections with the gauging levers 21 through a pair of connecting pins or studs 41 and 42. These pins are connected at their lower end to the levers 21 by screws 43. The slide rod 40 is mounted in holders 44 and

45 and has a fixed connection to the holder 44. The latter is in the form of a split bearing block by which the holder is attached to the pin 41. The split block 44 is claimed with a clamping screw 46 to a ball bearing cage 44a in which the connecting pin 41 is journalled. The holder 45 is attached in like manner to the pin 42.

A tube 47 is mounted to slide on the slide rod 40 and extends through an opening in the holder 45, the latter having a fixed connection with the tube 47. The tube 48, also mounted to slide on the slide rod 40, has attached thereto or formed integrally therewith, an electrical contact in the form of a disk 50. The tube 48 is yieldingly held in contact with the block 44, as shown in Fig. 4, by a coil spring 51 (Figs. 2 and 4). A pair of electrical contacts, in the form of contact screws 52 and 53, referred to respectively as maximum and minimum contact screws, are adjustably mounted in an insulating holder 54 of nylon or other suitable material. The holder 54 is mounted in fixed position on the tube 47 and has undersized tapped threads for the contact screws which serve as locking devices for the screws while permitting rapid and accurate adjustment of the screws within the holder. The slide bar 30 has mounted thereon a contact screw 55 which closes a microswitch 65 when the slide bar is retracted.

The operation is as follows:

While the rotating pad 13 is in its lowered position, a jar 14 is placed thereon. The bracket 12 is then moved upward and brings the jar to gauging position (Fig. 1) in which the jar is centered by the centering block 19. At this time the slide bar 30 is in its forward position so that it holds the gauging rolls 20 spaced apart sufficiently to permit the jar to reach its gauging position without coming into contact with said rolls. When the jar is in gauging position, shaft 35 is rocked to withdraw the roll 37 and permit the slide bar 30 to be moved to its retracted position by the spring 30a (Fig. 1) thereby closing the switch 65 and also swinging the bell crank levers away from the gauging arms 21 so that the gauging rolls 20 are brought into contact with the rim of the rotating jar 14. This contact is maintained during a complete rotation of the jar or for a sufficient length of time to permit the entire circumference of the jar to be gauged.

If the diameter of the jar is within the prescribed limits the contact disk 50 (Figs. 4 and 6) is maintained out of contact with the maximum and minimum contact screws 52 and 53. If the diameter of the jar rim or surface being tested is above the maximum prescribed limit, the gauging arm 21 carrying the connecting pin 42, will move the holder 45, tube 47 and holder 54 to the right (Fig. 4) and bring the maximum contact screw 52 into contact with the disk 50. This establishes a circuit (Fig. 6) through the coil 60 of a relay 61, said coil being in circuit with the secondary of a transformer 62 receiving current from the mains *a* and *b*. This circuit can be traced from the transformer through coil 60, contact screw 52, disk 50 and switch 65. When the circuit for the relay magnet coil 60 is thus closed the relay moves its contacts 66 and 67 to closed position. The contact 66 completes a circuit for a signal lamp 68 which is thereby lighted and indicates that the jar under test is above the maximum permissible diameter. The contact bar 67 closes a shunt circuit through wire 73 around the contacts 52 and 50 so that the signal lamp remains lighted until the slide bar 30 again moves forward and opens the switch 65. It will be noted that the slide tubes 47 and 48 and the holder 54 with the contact screws have a floating mounting permitting these parts to move as a unit carried on the gauging arms 21 so that the parts accommodate themselves to the position of the article under test. During the test these floating parts will be moved bodily to the right (Fig. 4) after the contact screw 52 engages the disk 50, when the surface under test is greater than the maximum permissible diameter, the parts being moved against the pull of the spring 51.

If the surface under test is less than the minimum permissible diameter, the tube 47 and holder 54 will be moved to the left a sufficient distance to bring the minimum contact screw 53 into contact with the disk 50 when the slide bar 30 has been withdrawn. This completes a circuit for the coil 70 of a relay 71, said coil being connected in circuit with the transformer 62 through the contact screw 53 and the disk. The relay 71 operates to complete a circuit for a second signal lamp 72 and also completes a holding circuit for the coil 70 through the wire 73. The signal lamp 72, which is preferably of a different color than the signal lamp 68 indicates that the jar under test is below the minimum permissible diameter. Although the gauging means (as shown) is used to light signal lamps, it will be understood that any other electroresponsive signalling means might be substituted for the lamps as for example, ejecting means for rejecting or segregating articles which are below or above prescribed limits from those that pass the test, when the apparatus is used for testing a multiplicity of articles in succession as is common in this art. Examples of such segregating and ejecting means are found in the patent to Owens, 2,481,863, September 13, 1949 and patent to Fedorchak et al., 2,352,091, June 20, 1944.

Modifications may be resorted to within the spirit and scope of our invention.

We claim:

1. Apparatus for gauging the circumferential surface of a round article, said apparatus comprising a pair of horizontally spaced gauging arms, a horizontal platform on which said arms are pivotally mounted for horizontal swinging movement toward and from each other, gauging rolls carried by said arms, means for positioning the article with said surface between the said rolls, spring means connected to said arms for holding the rolls in contact with said surface, a slide rod, a holder carrying said rod, means connecting said holder with one gauging arm for bodily movement of the holder and slide rod with the gauging arm, the slide rod extending lengthwise in its direction of movement, a tube mounted on the slide rod for sliding movement lengthwise thereof, a holder connecting said tube with the other gauging arm, an insulating holding device carried by said tube, electrical contact screws mounted on said holding device and adjustable toward and from each other, an electrical contact disk mounted for sliding movement on the slide rod and positioned between the contact screws, means for yieldingly holding the contact disk in a predetermined position relative to said first-mentioned holder for movement therewith and with said slide rod, said contact disk being in spaced relation to both said contact screws when the diameter of the surface under test is within prescribed limits and movable into engagement with the contact screws respectively when the diameter of said surface is above or below the pre-

scribed limits, and electroresponsive signalling means comprising electrical control circuits including the said contact screws.

2. The apparatus defined in claim 1 and in combination therewith, means for spreading the gauging arms and holding the contact rolls out of the path of the article to be gauged while the latter is being moved to gauging position, and automatic means for maintaining the control circuits open during the movement of the article into gauging position.

3. The apparatus defined in claim 1 and in combination therewith, means for spreading the gauging arms to permit movement of the article into gauging position, said spreading means comprising a pair of bell crank levers having arms

extending between the gauging arms, a slide bar mounted for lengthwise sliding movement and operably connected to the bell crank levers, a switch in circuit with said control circuits, and means carried by the slide bar for actuating the switch and preventing operation of the signalling devices while the gauging arms are held spread by the said spreading means.

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