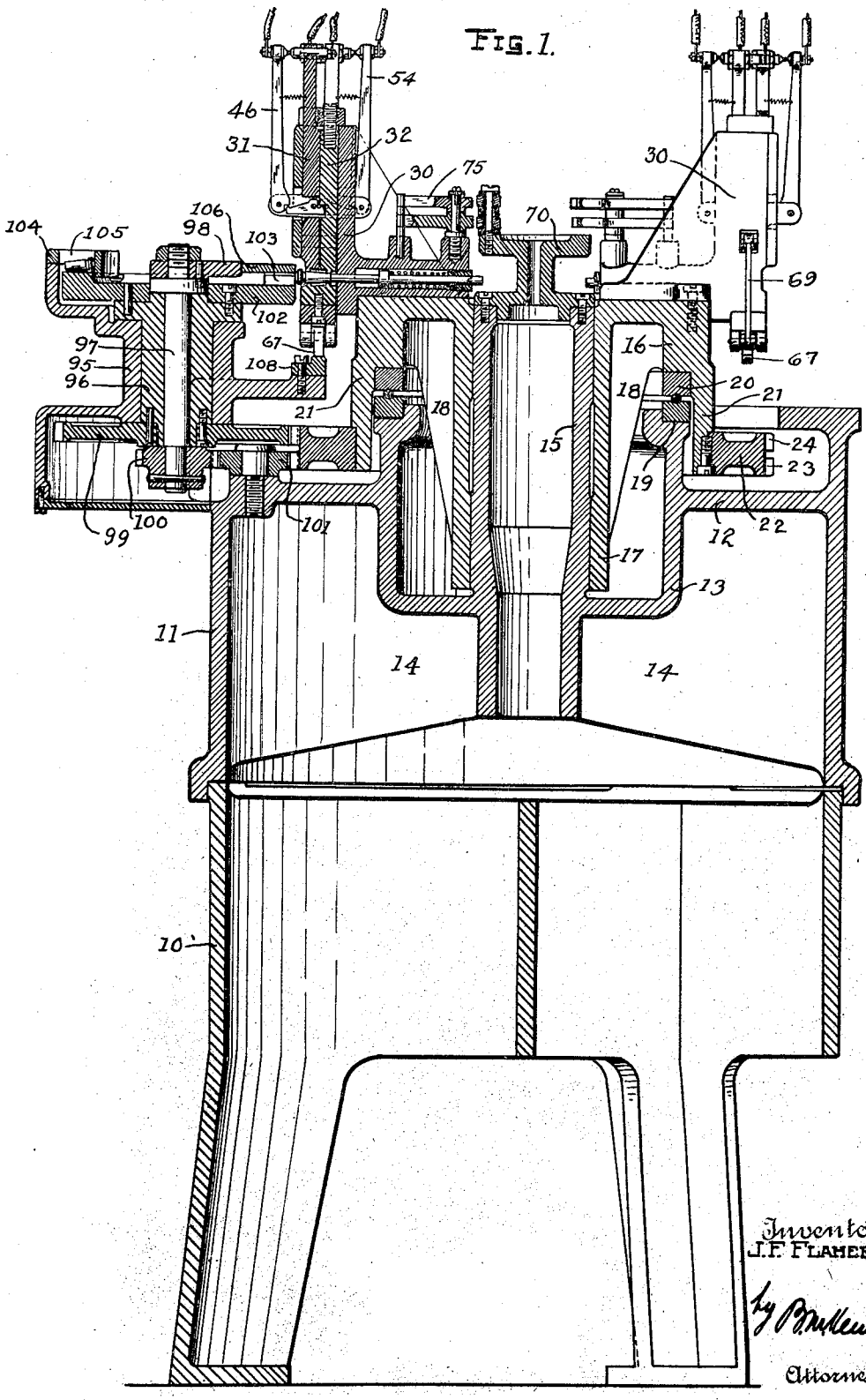
Dec. 23, 1924. 1,520,020

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ROLL GAUGING MACHINE

Filed May 2, 1921 3 Sheets-Sheet 1

Fig. 1.




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ROLL GAUGING MACHINE

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FIG. 2.

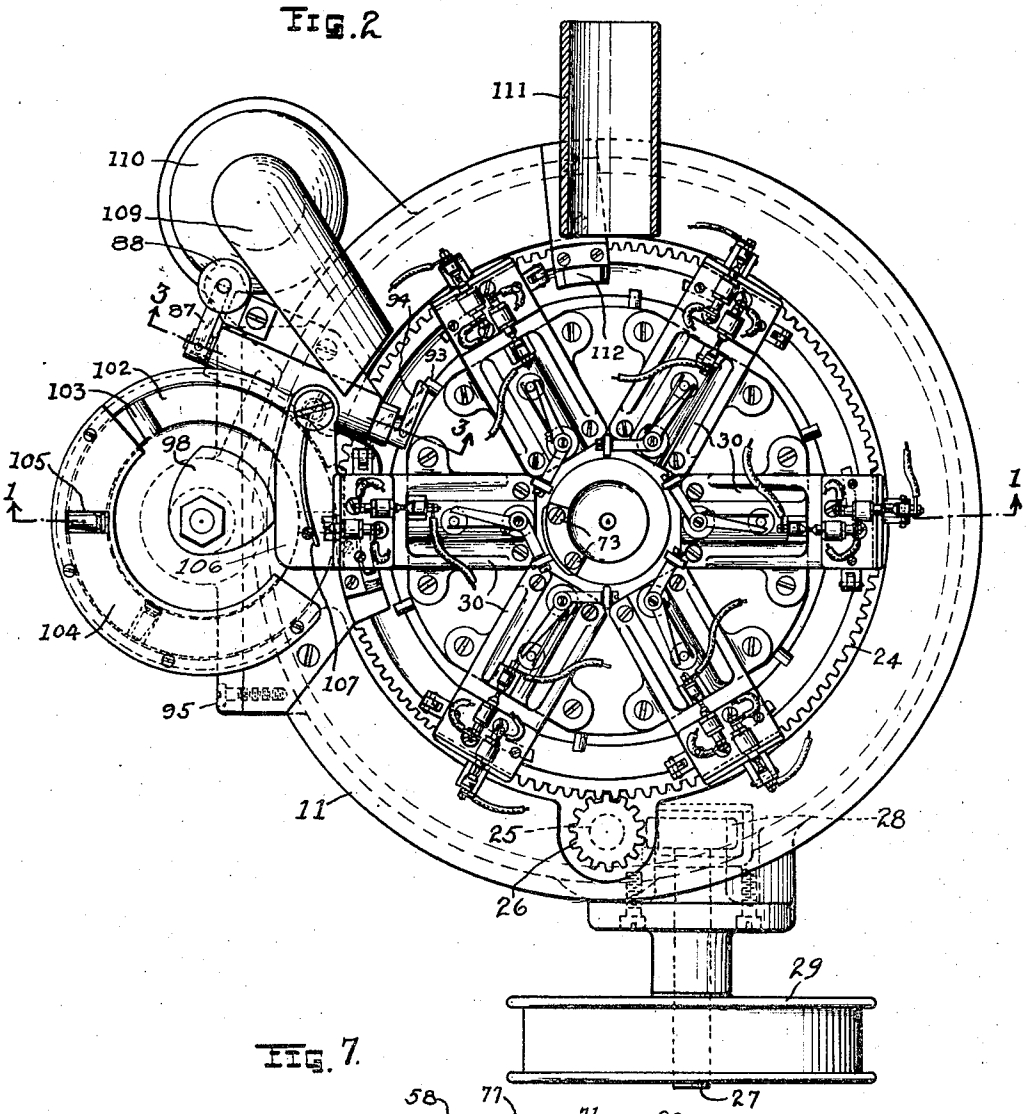
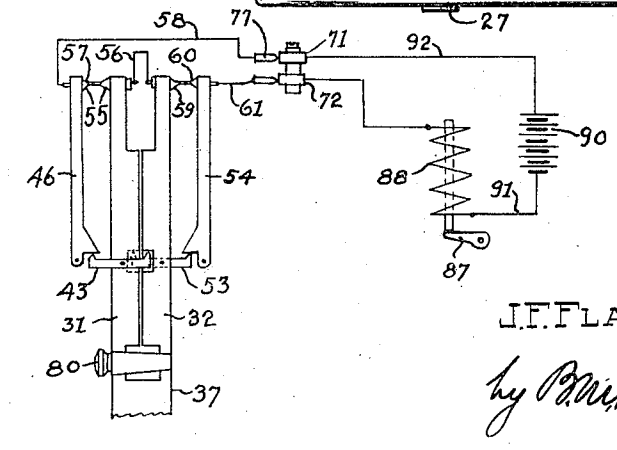



FIG. 7.




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ROLL GAUGING MACHINE

Filed May 2, 1921 3 Sheets-Sheet 3

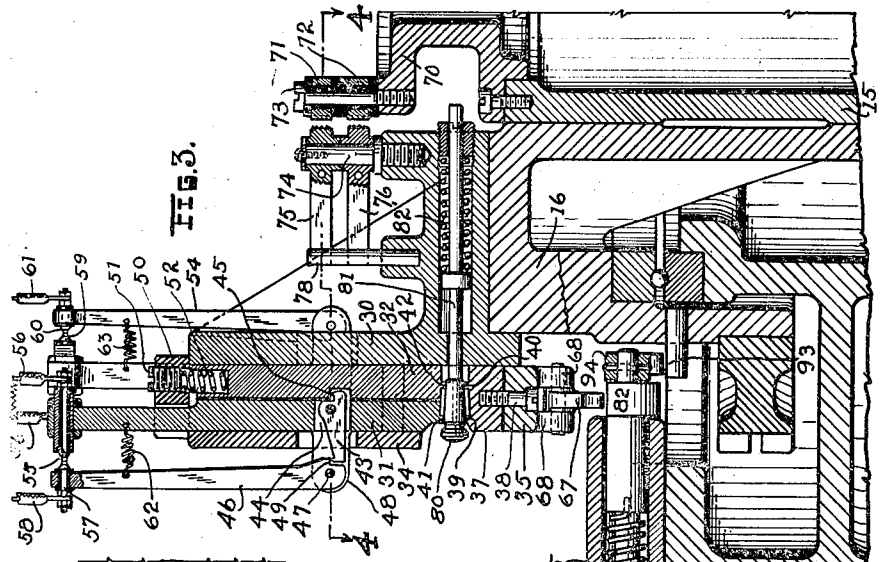


Fig. 3.

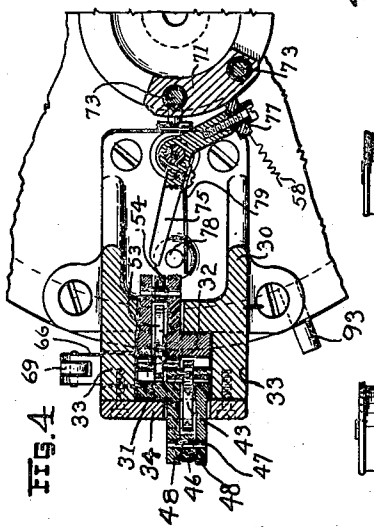


Fig. 4

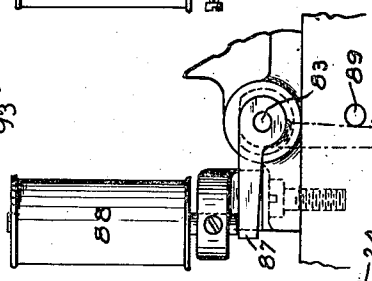


Fig. 6

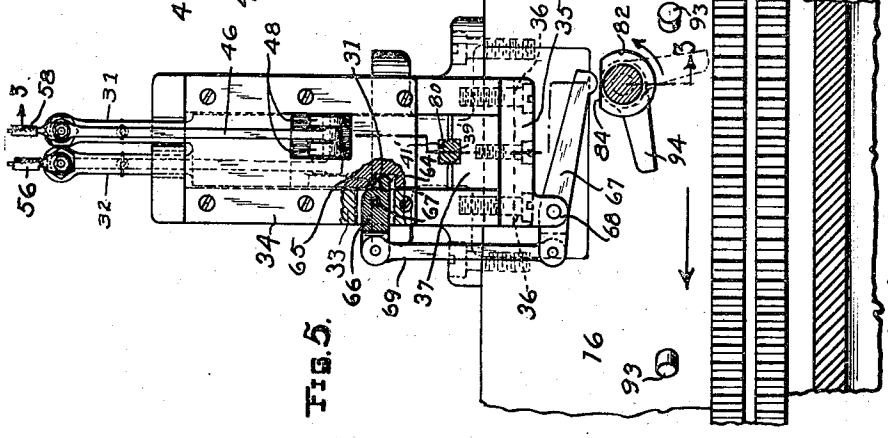


Fig. 5.

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# UNITED STATES PATENT OFFICE.

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## ROLL-GAUGING MACHINE.

Application filed May 2, 1921. Serial No. 466,153.

*To all whom it may concern:*

Be it known that I, JOHN F. FLAHERTY, a citizen of the United States, and a resident of Toledo, county of Lucas, State of Ohio, have invented certain new and useful Improvements in Roll-Gauging Machines, of which the following is a specification.

This invention relates to gauging machines and more particularly to machines for accurately gaging the taper of tapered rollers for bearings and for assorting the rollers.

One of the objects of the invention is to provide a machine of the class described which will be capable of detecting extremely small variations in the taper and which will be durable and with parts so designed that there will be a minimum amount of wear and this wear will not seriously affect the continued accuracy of the machine.

Another object of the invention is to provide a machine of the class described in which the rollers will be automatically fed into position to be gaged and, after being gaged, will be automatically assorted into the desired classification.

Other objects and the features of novelty will be apparent from the following description taken in connection with the accompanying drawings, of which;

Figure 1 is a vertical section thru a machine embodying my invention, the section being taken substantially on the line 1—1 of Figure 2;

Fig. 2 is a plan view of the machine;

Fig. 3 is a fragment of Fig. 1 with the addition of a section of certain parts as on the line 3—3 of Fig. 2, the major portion of the figure being on the line 3—3 of Fig. 5;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a side elevation of certain parts appearing in Fig. 3 with parts broken away and shown in section;

Fig. 6 is an end elevation of the adjacent parts of Fig. 3; and

Fig. 7 is a wiring diagram of the electrical portions of the mechanism.

Referring to the drawings, 10 indicates a base section preferably in the form of a substantial and rigid housing adapted to be secured on a suitable foundation and to support the upper section 11 which carries the various mechanisms of which the machine is comprised. The housing section 11 has an upper wall 12 at the center of which there is a wall 13 forming a well which is substantially braced by radially extending ribs 14 which connect it with the outer wall of the section. The wall 13 has a hollow spindle 15 projecting upwardly therefrom on which the table 16 is journalled by means of the sleeve 17, the latter being substantially braced by suitable radial ribs 18. At the upper edge of the wall 13 there is a seat 19 for an annular thrust bearing 20 which, as will be seen from Fig. 1, supports the table 16. This table 16 has an apron 21 which extends below and houses the bearing 20 and carries the gear ring 22 in which two sets of spur-gear teeth 23 and 24 are formed.

A vertical shaft 25, mounted in suitable bearings in the housing section 11, carries at its upper end a pinion 26 which meshes with the gear teeth 23 and 24 and is driven from a shaft 27, also suitably supported in the housing section 11, by suitable spiral or other gearing indicated at 28. The shaft 27 may be provided at its outer end with a pulley 29 by means of which it may be driven from any suitable source of power.

Mounted on the top of the table 16 are the brackets 30 which carry the gauging mechanism. From Fig. 2 it will be noted that I have provided six of the brackets 30 but it will be understood that more or less may be employed in accordance with the necessities of any particular case. Each of the brackets 30 carries a pair of cooperating verticaly adjustable gauging members 31 and 32 arranged between suitable ways 33 on the bracket and held in position by means of a suitable cover plate 34. At the lower end of the ways 33 a cross-member 35 is secured by suitable screws 36 and carries the stationary gauging block 37 which is secured to the cross-member by a screw 38. The block 37 is provided with the gauging surfaces 39 and 40, at the bottom of a slot 39′, which are adapted to contact with the end portions of the tapered surfaces to be gaged as is clearly seen in Fig. 3. The member 31 has a gauging surface 41 opposed to the surface 39 and the member 32 has a gauging surface 42 opposed to the surface 40, the surfaces 41 and 42 being at the bottom of a slot 41′. A lever 43, pivotally mounted in a suitable slot 44 in the member 31, has a knife-edge on which rests the upper surface 45 of a recess in the member 32. The position of the lever 43 will therefore

be determined by the relative positions of the members 31 and 32. A lever arm 46, mounted on a pivot 47 between the ears 48 on the member 31, has a surface 49 adjacent the pivot 47 which is engaged by a knife-edge on the outer end of the lever 43. Thus the position of the lever 46 will vary in accordance with the position of the lever 43 and, on account of the relatively great length of the lever 46, as compared with the distance between the pivot 47 and the knife-edge on the lever 43, it will be seen that any movement of the end of the lever 43 will be greatly multiplied in the lever 46 so that the upper end of the lever will have appreciable movements for the almost imperceptible movements of the lever 43.

A cross-member 50, on the upper end of the bracket 30, carries an adjusting screw 51 by means of which the tension of a spring 52 arranged between the screw 51 and the member 32, may be adjusted. There is a spring similar to spring 52, in cooperation with the member 31.

The member 32 carries a small lever 53 (see Fig. 4) which is similar to the lever 43 but oppositely arranged with reference to the latter and has a knife-edge cooperating with a surface on the member 31 similar to the surface 45 on the member 32, and the outer end of the lever 53 has a knife-edge which cooperates with a lever 54, similar in all respects to the lever 46. The member 31 has an upward extension which carries a contact member 55, preferably insulated therefrom in any suitable manner and with which the flexible wire 56 is connected. A contact member 57, carried by the upper end of the lever 46, cooperates with the member 55 and has connected therewith a wire 58. In a similar manner the member 32 has an upward extension which carries a contact member 59 with which a contact member 60, on the upper end of the arm 54, cooperates, the member 60 having connected therewith a wire 61. The wire 56 is also connected with the member 59 so that, when these several members are in contact, a circuit will be completed from the wire 58 thru the wire 56 to the wire 61. A coiled spring 62 lightly holds the members 55 and 57 normally in contact and the spring 63 holds the members 59 and 60 in contact.

The members 31 and 32 have normally aligned recesses 64 in the sides thereof with the upper surfaces 65 of which (see Fig. 5) a knife-edge on the lever 66 cooperates, this lever being mounted on a pivot 67′ on one of the ways 33. A cam lever 67 mounted between lugs 68 which project from the lower surface of the cross-member 35, has one end connected with the lever 66 by means of the link 69.

A pedestal 70 secured to the upper end of the spindle 15 carries a pair of contact members 71 and 72, which are secured to the pedestal by the screws 73, and are insulated from each other and from the pedestal as shown in Fig. 3. Associated with each of the brackets 30 is a vertical pivot 74 on which the levers 75 and 76 are mounted. The lever 75 carries a contact member 77 which is insulated therefrom but adapted to contact with the member 71. The lever 76 carries a contact member similar to 77 which is adapted to contact with the member 72. The wire 58 is connected with the member 77 and the wire 61 is connected with the corresponding member carried by the lever 76. By this means an electrical circuit is completed from the contact member 71 to the contact member 72 but, as will be readily understood, this circuit may be interrupted by the separation of the contacts 55 and 57 or the contacts 59 and 60. A pin 78 projects upwardly from the base of the bracket 30 close to the levers 75 and 76 (see Fig. 4) and leaf springs 79, carried by the levers 75 and 76, engage these pins and normally press the contacts carried by the levers against the contacts 71 and 72. The movement of the levers is restricted by the pin 78 as will be readily understood from Fig. 4 so that the levers are prevented from being thrown out of position when their respective contact members leave the members 71 and 72.

The roller to be gaged is indicated at 80 in Fig. 3 and Fig. 5 and is normally pressed outwardly by a plunger 81 and a spring 82′ suitably housed in the bracket 30. The slots 39′ and 41′ are slightly wider than the roller so that merely the downward pressure of the members 31 and 32 holds the roller in the position shown and when these members are lifted, as will be hereinafter described, the roller will be released and ejected by the plunger 81. The lifting of the members 31 and 32 to release the roller is effected by a cam 82 on the shaft 83. As will be seen from Fig. 5, the cam 82 is of generally cylindrical form with a flat surface 84. A torsion spring 85 is connected with the shaft 83 and the bearing 86 in which the shaft is carried and normally tends to rotate the shaft in the direction of the arrow in Fig. 5.

An arm 87, secured to the outer end of the shaft 83 cooperates with the core of an electro-magnet 88 which, when energized, holds the arm 87 in the position shown in Fig. 6. When the electro-magnet 88 is de-energized, the weight of the arm 87 and the force of the spring 85 will turn the shaft 83 so that the arm 87 will rest against a stop-pin 89.

Referring to Fig. 7, it will be observed that the electro-magnet 88 is connected in series with the contact members 71 and 72

and a source of an electric current 90 by the wires 91 and 92. It will also be observed from this figure that, when the contacts 55 and 57 or the contacts 59 and 60 are separated, the circuit, which includes the electro-magnet 88, will be broken thereby de-energizing the electro-magnet. If the roller to be gaged is of the proper taper, the members 31 and 32 will have definite relative positions as will also the levers 46 and 53 and the electric contacts will be maintained, regardless of variations in the size of the roller. If, however, the roller is not of the proper taper, the relation of the members 31 and 32 will be changed and one or the other of the sets of contacts 55 and 57 or 59 and 60 will be broken. Thus it is possible to separate the rollers into two classes, one class being those of proper taper and the other class being those not having the proper taper.

After the roller has been positioned, as shown in Fig. 3, if it is of the proper taper, the electro-magnet 88 will be maintained in the energized state and the cam 82 will have the flat portion 84 presented to the path of the free end of the lever 67 as the latter travels with the revolving table 16. As will be seen from Fig. 5 the lever 67 will pass over the surface 84 without making contact therewith but, if the electro-magnet 88 is de-energized, the shaft 83 will have been rotated to present a high part of the cam 82 to the path of the lever 67 and the end of this lever will, in riding up over this cam, actuate the lever 66 to lift the members 31 and 32, thereby releasing the roller which will be instantly ejected by the plunger 81.

After the roller has been ejected, a pin 93 on the periphery of the table 16, will engage with an arm 94 on the inner end of the shaft 83 and restore the parts to the position shown in Fig. 6, it being remembered that the arm 94 will be swung around from the full line position to the dotted line position in Fig. 5, when the electro-magnet 88 is de-energized.

The mechanism for feeding the rollers is claimed in my co-pending application No. 416,935, filed October 14, 1920 and comprises a housing 95 secured to the housing section 11 and carrying a hollow vertical shaft 96 within which is rotatable a shaft 97 on the upper end of which is the cam 98. The shaft 96 carries, at its lower end, a gear 99 which meshes with the teeth 24 and the shaft 97 carries a gear 100 which meshes with an idler gear 101 and this idler gear, in turn, meshes with the teeth 23. The shaft 96 carries, at its upper end, a disk 102 having an upwardly extending peripheral flange in which a series of radial slots 103 are formed to receive the rollers. A cover-plate 104 is secured on the housing 95 and extends over about one-half of the flange on the disk 102 as shown in Fig. 2. The cover-plate 104 has a slot 105 thru which rollers may be fed to the slots 103 and, when the rollers drop into these slots, they will be carried around in position to be ejected outwardly from the slots into the gauging mechanism by the arm 106 which is actuated by the cam 98. The disk 102, being positively geared to the table 16, will rotate in definite relation to the table so that one of the slots 103 will be presented in alignment with each gauging mechanism as it comes into position to receive a roller. When the roller is approaching the position where it is ejected into the gauging mechanism, the arm 106 will be retracted from the position shown in Fig. 2 under the influence of the spring 107, and, when the roller comes into alignment with the gauging mechanism, the arm 106 will be actuated by the cam 98 and force the roller out of the slot 103 and into position in the gauging mechanism as shown in Figs. 1 and 3. Just before the gauging mechanism receives the roller the members 31 and 32 are lifted by the engagement of the lever 67 with a stationary block 108 on the housing 95 (see Fig. 1). The lever 67 continues to ride on the block 108 until the roller has been properly positioned and then the lever will run off the block 108 and permit the members 31 and 32 to descend and grip the roller. Also just prior to the receipt of the roller by the gauging mechanism, the contact members, carried by the members 75 and 76, will engage the contact members 71 and 72 and thereby cause the electro-magnet 88 to be energized and hold the shaft 83 with the parts in the position shown in Fig. 6, when the shaft has been turned by the engagement of the pin 93 with the lever 94. When the members 31 and 32 grip the roller, if the latter is of the proper taper, the electro-magnet 88 will be maintained in the energized condition and the lever 67 will not be actuated to release the roller when it passes over the cam 82. If, however, the roller is not of the proper taper, the electro-magnet 88 will be de-energized and the shaft 83 will be turned, so that the cam 82 will trip the lever 67 after the pin 93 passes out from under the lever 94.

Referring to Fig. 2, it will be seen that I have illustrated a chute 109 and the rollers having an improper taper will be ejected into this chute and fall therefrom into any suitable receptacle 110, but the rollers which are of proper taper will be carried around until in alignment with the chute 111, when the lever 67 will be tripped by a stationary block or cam 112.

The cam 112 is so positioned as to trip each of the levers 67 so that any rollers which have not been ejected into the chute 109, will be ejected into the chute 111.

While I have illustrated and described what I now consider to be the preferred form of my invention, yet it will be understood that the details of construction are susceptible to changes without departing from the scope of the invention as described in the appended claims.

Having thus described my invention, what I claim is:

1. In a machine of the class described, the combination of a gauging member on which the article is received, a plurality of relatively movable members opposed to said gauging member and cooperating with the latter to grip the article, means for separating said members to release the article, a tripping member for actuating said releasing means, and means controlled by the relation of said relatively movable members for controlling the position of said tripping member.

2. In a machine of the class described, the combination of a gauging member on which the article is received, a plurality of relatively movable members opposed to said gauging member and cooperating with the latter to grip the article, means for separating said members to release the article, a tripping member for actuating said releasing means, electrical contacts controlled by the relation of said relatively movable members, and electrically controlled means in circuit with said contacts and controlling said tripping member.

3. In a machine of the class described, the combination of a gauging member on which the article is received, a plurality of relatively movable members opposed to said gauging member and cooperating with the latter to grip the article, means for withdrawing said relatively movable members from the article to release it, means for ejecting the article when thus released, a member for actuating said withdrawing means, and means for controlling the last mentioned member in accordance with the relative positions of said relatively movable members when in contact with the article.

4. In a machine of the class described, the combination of a revoluble member, means thereon for carrying the article comprising two members adapted to contact with points spaced axially of the article, article-releasing means carried by said revoluble member, a member for actuating said releasing means, and means controlling the last mentioned member in accordance with the relative positions of said two members when in contact with the article.

5. In a machine of the class described, the combination of a revoluble member, means thereon for carrying the article comprising two members adapted to contact with points spaced axially of the article, article-releasing means carried by said revoluble member, a rotatable cam for tripping said releasing means, and means for setting said cam controlled in accordance with the relation of said two members when in contact with the article.

6. In a machine of the class described, the combination of a revoluble member, means thereon for carrying the article comprising two members adapted to contact with points spaced axially of the article, article-releasing means carried by said revoluble member, a rotatable cam for tripping said releasing means, means for setting said cam controlled in accordance with the relation of said two members when in contact with the article, and means for automatically restoring said cam to its normal position after said releasing means have been tripped.

7. In a machine of the class described, the combination of a revoluble member, means thereon for carrying the article comprising two members adapted to contact with points spaced axially of the article, article-releasing means carried by said revoluble member, a relatively stationary member for actuating said releasing means, electrically controlled means for controlling said actuating member, a circuit-breaker actuated by a relative movement between said two members, and circuit connections between said breaker and said electrically controlled means.

8. In a machine of the class described, the combination of a gauging block, two relatively movable gauging members opposed to said gauging block and adapted to contact with the article at points spaced axially thereof, an electrical contact carried by one of said members, a lever carried by said member and having a contact cooperating with said electrical contact, means whereby said lever is moved in accordance with relative movements of said gauging members, means whereby the article is ejected, and electrical means in circuit with said contacts and controlled thereby to actuate said ejecting means.

9. In a machine of the class described, the combination of a gauging block, two relatively movable gauging members opposed to said gauging block and adapted to contact with the article at points spaced axially thereof, an electrical contact carried by one of said members, a lever carried by said member and having a contact cooperating with said electrical contact, means whereby said lever is moved in accordance with relative movements of said gauging members, a lever for actuating said gauging members to release the article, means adapted to be positioned to actuate said lever, and electrical means in circuit with said contacts and controlled thereby to control the position of said lever-actuating means.

10. In a machine of the class described,

the combination of a gauging block, two relatively movable gauging members opposed to said gauging block and adapted to contact with the article at points spaced axially thereof, an electrical contact on each of said members, a lever carried by each of said members and provided with a contact cooperating with the first-mentioned contact thereon, means whereby each of said levers is actuated by the opposite gauging member, and electrically controlled article-ejecting means in circuit with and controlled by said contacts.

11. In a machine of the class described, the combination of a gauging block, two relatively movable gauging members opposed to said gauging block and adapted to contact with the article at points spaced axially thereof, spring means for causing said gauging members to grip the article, a lever for actuating said gauging members in opposition to said means to release the article, means adapted to be positioned to actuate said lever, and means controlled by the relation of said gauging members when in contact with the article for actuating said lever-actuating means.

12. In a machine of the class described, the combination of a revoluble member, means thereon for carrying the article comprising members adapted to contact with the article at points spaced axially thereof, means for automatically feeding the article to said revoluble member, relatively stationary means for actuating said members to release the article, electromagnetic means for controlling the last-mentioned means, circuit-breaking means carried by said member, and circuit connections between said electromagnetic means and said circuit-breaking means.

13. In a machine of the class described, the combination of a gauging block, two relatively movable members opposed to said block and adapted to contact with the article at points spaced axially thereof, a lever pivotally mounted on one of said members and engaging the other member so as to be moved in accordance with the relative movements of said members, and article-releasing means controlled by said lever.

14. In a machine of the class described, the combination of a gauging block, two relatively movable members opposed to said block and adapted to contact with the article at points spaced axially thereof, a lever pivotally mounted on each of said members and engaging the other member so as to be moved in accordance with the relative movements of said members, and article-releasing means controlled by said levers.

15. In a machine of the class described, the combination of article-gripping means comprising members adapted to contact with the article at points spaced axially thereon, and means controlled by the relation of said members when in contact with the article adapted to withdraw said members from the article to release the latter.

In testimony whereof I affix my signature.

JOHN F. FLAHERTY.