June 19, 1923. 1,458,929

J. F. FLAHERTY

ROLL GAUGING MACHINE

Filed Oct. 14, 1920 4 Sheets-Sheet 1

FIG. 1.

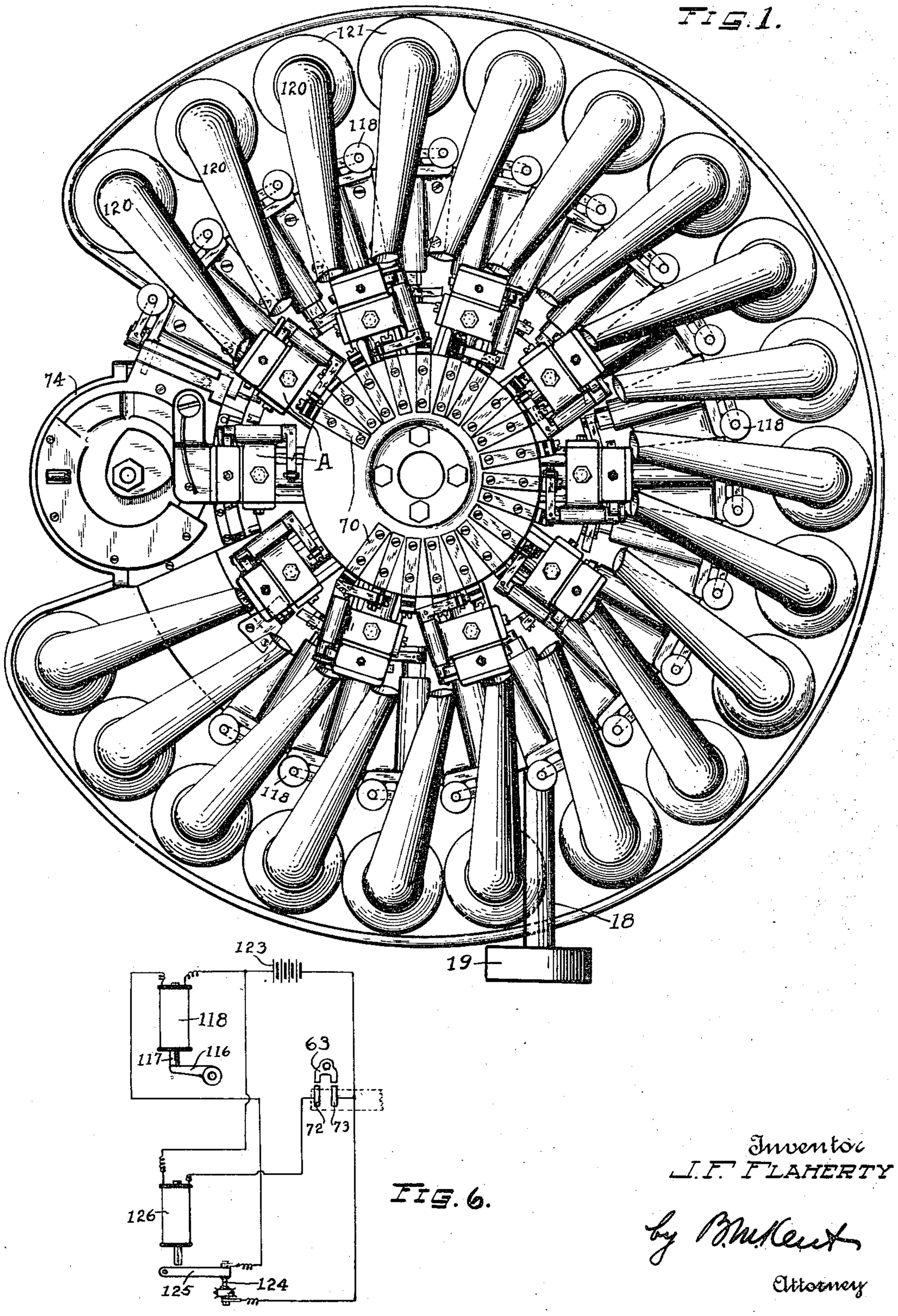

FIG. 6.

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ROLL GAUGING MACHINE

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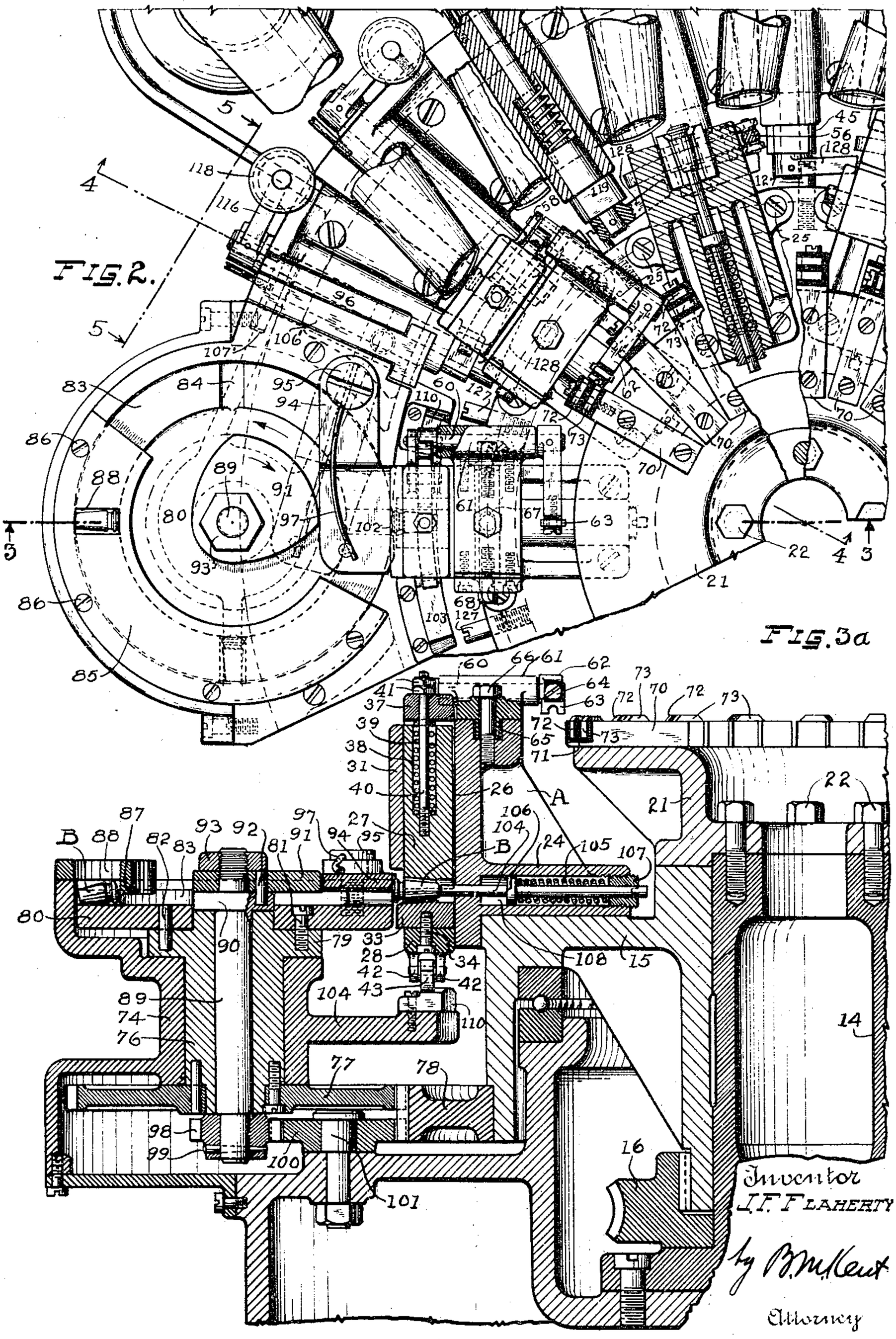

FIG. 2.

FIG. 3a

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ROLL GAUGING MACHINE

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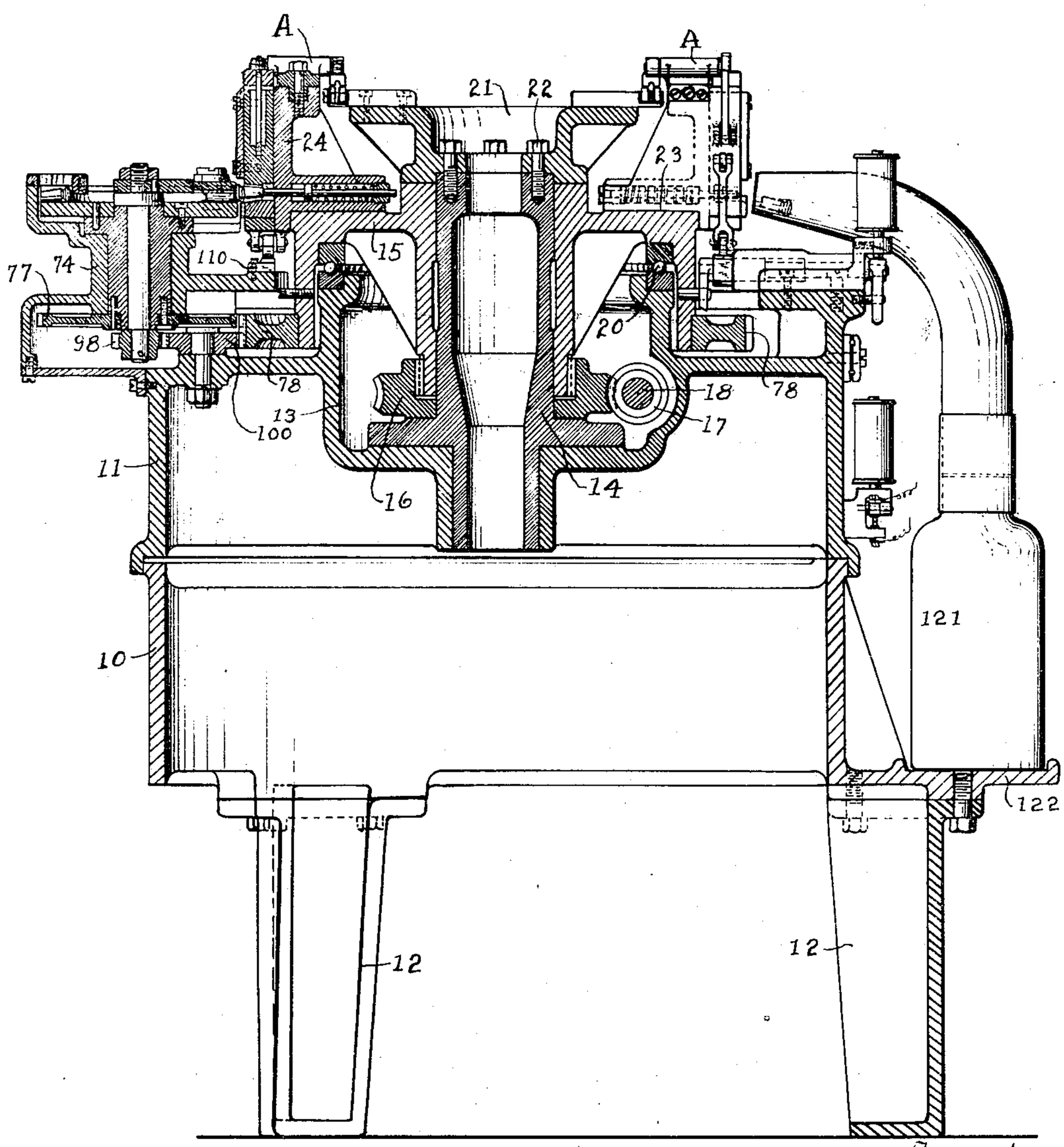
FIG. 3.



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ROLL GAUGING MACHINE

Filed Oct. 14, 1920 4 Sheets-Sheet 4

FIG. 4

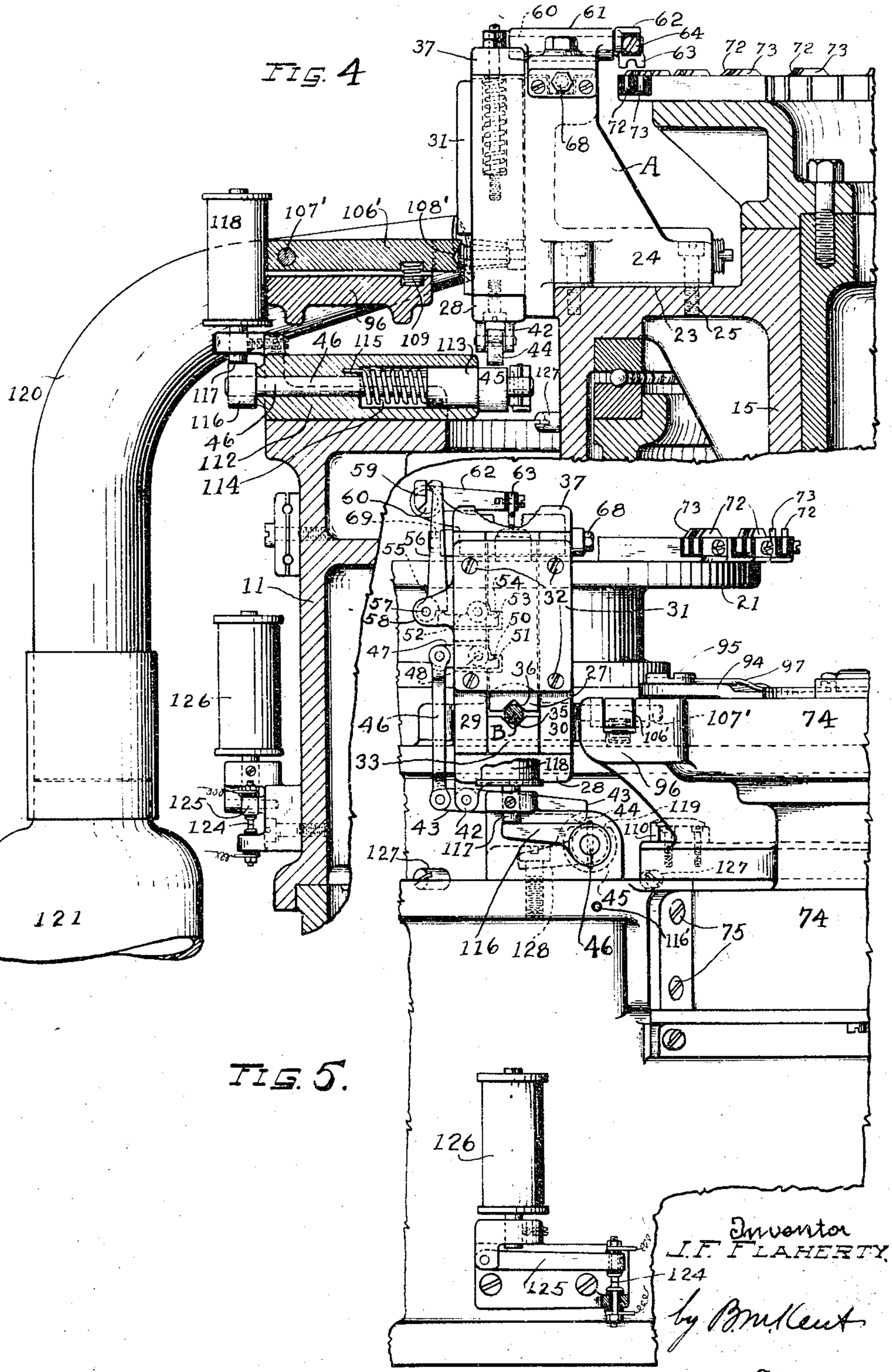

FIG. 5.

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Patented June 19, 1923. 1,458,929

UNITED STATES PATENT OFFICE.

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ROLL-GAUGING MACHINE.

Application filed October 14, 1920. Serial No. 416,935.

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 machines for gauging and assorting articles and particularly to machines of this type for assorting rollers for bearings.

It is one of the objects of the invention to provide a comparatively simple machine for this purpose which will be capable of automatically feeding the articles and assorting them into the desired sizes and so constructed as to be reliable and accurate in operation and with its vital parts not subject to rapid wear.

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

Figure 1 is a plan view of a machine embodying the invention;

Fig. 2 is an enlarged fragment of Fig. 1 with certain parts shown in sections;

Fig. 3 is a transverse section on the same scale as Fig. 1, the section being taken on the line 3—3 appearing in Fig. 2;

Fig. 3ª is an enlarged fragment of Fig. 3;

Fig. 4 is a transverse section of certain parts on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary side elevation of certain parts as seen from the line 5—5 of Fig. 2; and

Fig. 6 is a diagrammatic view of the electrical parts of the machine to show the arrangement of the circuits.

Referring to the drawings, and particularly to Fig. 3, it will be seen that the frame of the machine consists of the superimposed sections 10 and 11 of substantially cylindrical form supported on legs 12 and that the section 11 includes a centrally arranged housing 13 in which the vertical spindle 14 is secured. A table 15 is rotatably arranged on the spindle 14 and has a worm gear 16 keyed to its lower end so that the table will be driven thereby. The gear 16 is driven by a worm 17 on the shaft 18, which projects beyond the frame of the machine and carries a driving pulley 19, or other suitable means, whereby it may be rotated. The table 15 is supported on the top of the housing 13 by means of an annular ball bearing 20 and is held down by means of a stationary table 21, which is secured to the upper end of the spindle 14 by screws 22.

A plurality of calipering devices are secured on the upper surface 23 of the table 15 and arranged around the periphery thereof and from Fig. 1, it will be observed that there are ten of these calipering devices, which are indicated generally by the reference character A. Each of said calipering devices comprises a frame 24, which is secured on the surface 23 by screws 25 and has at its radially outward side a vertically extending groove or slot 26 in which is arranged the slide or movable jaw 27. A cross member 28 is secured to the lower end of the ways 29 and 30 which project outwardly from the face of the calipering device and form the slot 26. A cover plate 31 is secured to the ways 29 and 30 by means of screws 32, and serves to retain the slide 27 in the slot 26. A block 33 is secured on the member 28, at the bottom of the slot 26, by means of a screw 34 and has a tapering V-shaped groove 35 in its upper surface which cooperates with a corresponding groove 36 in the lower end of the slide 27 to hold the article to be gauged, which is indicated by the reference character B. The article in this case has a tapered or conical surface, with which the tapered grooves 35 and 36 correspond.

A cross member 37 is arranged on the upper ends of the ways 29 and 30 and the slide 27 is provided with a bore 38 extending from its upper end and in which is arranged a spring 39, the upper end of which bears against the under side of the member 37 and is thus adapted to exert downward pressure on the slide 27 and cause the article to be firmly gripped between the slide and the block 33, which cooperate as jaws to securely hold the article. A rod 40 is secured in the slide 27 and projects upwardly through the spring 39 and the member 37 and carries on its upper end the adjustable nuts 41, which serve as a stop to limit the extent of the downward movement of the slide 27 by engagement with the top surface of the member 37.

A pair of spaced lugs 42 project down-

wardly from the member 28 and a cam lever 43 is pivotally mounted between them. At one end, the lever 43 carries a downward projection 44 adapted to cooperate with the cam 45 on the shaft 46. The opposite end of the lever 43 is pivotally connected with a vertically arranged link 46, the upper end of which is pivoted to one end of a link 47 that is fulcrumed at 48 in the way 29, the opposite end of the link 47 having a knife edge 50, which engages the upper surface 51 of a notch in the slide 27. This connection between the lever 43 and the slide 27 causes the latter to be lifted and release the article when the end of the lever 43 is lifted by the cam 45. A lever 52 is also fulcrumed in the way 29 and has a knife edge 53 at one end engaging the upper surface 54 of a notch in the slide 27. The opposite end of the lever 52 has a knife edge 55 which engages a surface on the lever 56 close to the fulcrum 57 of the latter in lugs 58 projecting from the side of the way 29. At the upper end of the lever 56, there is a knife edge which cooperates with a surface 59 on the horizontally arranged shaft 60 which is journaled in the bearing brackets 61 on the top of the member 24. The inner end of the shaft 60 carries a lever 62, on the free end of which is a brush 63, for a purpose to be hereinafter described. The brush 63 is insulated from the lever 62 and secured on the end of the latter by means of a screw 64.

For a purpose which will be hereinafter made apparent, it is desirable to have the lever 62 adjustable so as to accurately locate the lower or contacting edge of the brush 63, vertically, and for this purpose, I have provided a tongue and groove connection 65 between the bracket 61 and the member 24, this tongue and groove extending at right angles to the shaft 60. The bracket 61 is secured on the member 24 by means of the screw 66, which extends through a slot in the bracket 61, this slot being elongated in the direction of the tongue and groove, as indicated at 67 in Fig. 2. The adjustment of the bracket 61 is made by means of the screws 68 and 69 and it will be noted that the movement of the bracket at right angles to the shaft 60 will cause the brush 63 to be raised or lowered, depending upon the direction of adjustment, the position of the lever 66 remaining stationary during adjustment.

Secured on the top of the table 21 is a series of contact holders 70, there being one of these contact holders for each side into which the articles are to be assorted, and in Fig. 1, I have indicated nineteen of these contact holders. At the outer end, each contact holder carries an insulator 71, in which there are arranged the contacts 72 and 73, these contacts being insulated from each other and being so positioned that the brushes 63 are adapted to wipe over them and make connection therebetween as the table 15 revolves.

For the purpose of automatically feeding the articles, I have provided a mechanism which comprises a housing 74, secured to the section 11 of the frame by screws, as indicated at 75, and having journaled therein the hollow vertical shaft or spindle 76, to the lower end of which there is secured a gear 77, which meshes with a ring gear 78 on the table 15. The spindle 76 has a flange 79 at its upper end, which serves as a thrust collar for the spindle and also as a point of attachment for the disc 80, which may be secured thereto by screws 81 and a dowel 82. An upstanding flange 83 on the disc 80 is provided with a series of radially extending notches or pockets 84 adapted to receive the articles to be gaged. A cover plate 85 of semi-circular form is secured on the housing 74, by means of screws 86, over a portion of the flange 83, this cover having a depending flange 87 on its inner circumference, which slightly overlaps the inner circumference of the flange 83, as best shown in Fig. 3ª. In this figure, an article is shown in position in one of the pockets 84, and it will be observed that the flange 87 cooperates with the upper part of the housing 74, to hold the article endwise in its pocket. It will also be observed that there is an opening 88 in the cover 85, through which the articles may be fed to the pockets 84, by any suitable means, it being the intention to have an article always in position in the opening 88, so that when one of the pockets 84 registers therewith, the article will drop into the pocket and another article will be fed to the opening and be ready to drop into the next pocket as the disc 80 rotates.

A shaft 89 is journaled in the spindle 76 and is provided, near its upper end, with a collar 90, which takes the downward thrust of the shaft. A cam 91 is arranged on the shaft 89 above the collar 90 and secured by means of a dowel 92 and nut 93, so that the cam will rotate with the shaft. A lever 94 is fulcrumed on a stud 95, which is secured in a bracket 96 on the housing 74. This lever cooperates with the cam 91, so as to be moved thereby toward the center of the machine, being returned by a suitable spring, such as indicated at 97, which is adapted to hold the lever in contact with the cam at all times. The shaft 89 has a pinion 98 secured to its lower end by means of a pin 99, and the pinion 98 meshes with an idler gear 100, which is mounted on the stud 101 and meshes with the gear 78.

There being ten of the calipering devices A equally spaced around the table 15, it is desirable to have the rotations of the table and the feeding disc 80 so timed that an article will be delivered to each calipering de-

vice as it comes into cooperative relation with the feeding disc 80, and to this end, there being four of the pockets 84 in the disc 80, the ratio of the gears 77 and 78 is as 4 is to 10.

From Fig. 2, it will be observed that one of the pockets 84 is in registration with the jaws of the calipering device and that the article has been delivered from the pocket to the calipering device, this being effected by the lever 94. The feeding disc 80 rotates in the direction of the arrow shown in Fig. 2, while the cam 91 rotates in the opposite direction. As the pocket with the article therein approaches the position where the article is delivered to the calipering device which position is 180° from the opening 88 (see Fig. 2), the lever 94 will be in the dotted-line position with the edge 102 adapted to engage the head of the article, which, it will be noted, is directed toward the axis of the disc 80. The cam 91 will then force the lever 94 toward the calipering device and thereby push the article out of the pocket 84 into the jaws of the calipering device. Before the article is thus delivered to the calipering device, the jaws are opened by contact of the lever 43 with the stationary cam 103, which is secured on a shelf 104 projecting from the inner side of the housing 74. The cam 103 causes the slide or jaw 27 to be lifted and after the article has been received by the jaws, the lever 43 will leave the cam 103 and permit the jaws to be closed by the spring 39 and thus firmly grip the article. From Fig. 3ª, it will be noted that there is a plunger 104 in engagement with the article when the latter is in the jaws of the calipering device and this plunger normally exerts outward pressure on the article, tending to eject it from the jaws, because of the action of the spring 105, which is arranged between a collar 106 on the plunger and the adjustable plug 107 at the end of the opening 108 in which the spring and plunger are arranged. As the article is forced into the jaws by the action of the cam 89, the spring 105 is compressed.

Since the mechanism is especially adapted for gauging conical articles, it is, of course, essential that the article be accurately positioned, endwise, in the jaws. I have, therefore, provided means for uniformly and accurately locating the articles, this means consisting of a member 106′ which is pivoted at 107′ on the bracket 96 and has an elongated inner end in which there is a circumferentially extending V-groove 108′ (see Fig. 4). A small spring 109 arranged between the bracket 96 and the member 106′ yieldably holds the inner end of the member 106′ in substantial alignment with the article in the calipering device. As the calipering device carries the article from the feeding mechanism, the head of the article will be presented to the groove 108′, a stationary cam 110 lifting the jaw 27 when the article is in alignment with the member 106′, so as to permit the plunger 104 to force the article firmly into the V-groove 108′. The lever 43 immediately leaves the cam 110 and thus causes the article to be again gripped by the jaws while it is still in contact with the member 106′, and in this manner, the different articles are uniformly and accurately located endwise, in the calipering devices.

From the description of the calipering device which has been heretofore given, it will be apparent that the diameter of the article will determine the elevation of the lower edge of the brush 63, and the linkage which connects the slide 27 with the lever 62 is so arranged that slight variations in the diameter of the article will be greatly multiplied in the variations in the position of the brush 63 and, in practise, this multiplication should be as much as 100 to 1, so that variations of one-fourth of one-thousandth of an inch in the diameter of the article will vary the position of the brush one hundred times as much, or 0.025″. Since each pair of contacts 72 and 73 is for the purpose of selecting a particular size of article, these contacts are, therefore, arranged in stepped relation, the first pair of contacts over which the brush 63 passes after the article has been fed to the calipering device being lowest and the succeeding contacts being at gradually higher elevations. For the purpose of effecting the release and discharge of the article, there is associated with each pair of contacts 72 and 73 one of the cams 43 heretofore referred to. The shaft 46 which carries the cam 45 is mounted in the bearing 112 on the upper surface of the section 11 of the frame. The shaft 46 has an enlarged portion 113 to which one end of a torsion spring 114 is connected, the other end of the spring being connected with the bearing 112, as indicated at 115. The outer end of the shaft 46 carries an arm 116, the end of which is normally arranged adjacent the core 117 of an electromagnet 118 so as to be supported thereby. In this position, the flat side 119 of the cam 45 is presented toward the lever 43 as the latter travels, so that this lever will normally pass over the cam without coming in contact therewith. When the electromagnet 118 is de-energized, the spring 114 turns the shaft 46 so as to drop the arm 116 against a stop 116′ and present the high side of the cam 45 toward the lever 43, so that the end of this lever will strike the cam and be lifted thereby and release the article. When thus released, the plunger 104 will eject the article into one of the chutes 120, whereby it will be conducted to a re-

ceptacle 121 arranged on the shelf 122 which surrounds the bottom of the section 10 of the frame.

Referring to Fig. 6, it will be observed that the electromagnet 118 is normally in circuit with the source of current 123 through the contacts 124. So long as the circuit supplying the electromagnet 118 is closed, the arm 116 is held in the position indicated in Figs. 5 and 6, but whenever the contacts 124 are separted so as to break this circuit, the electromagnet 118 will be de-energized and permitted to drop and thereby effect the release of the article in the manner above described. It is the function of the machine to sort the articles into graduated sizes and, therefore, arrangement is made for releasing each article when it is opposite the chute 120 leading to the receptacle for its particular size. In order to separate the contacts 124, one of them is mounted on an arm 125 which is arranged to be lifted by the electromagnet 126. This electromagnet is arranged in series with a pair of the contacts 72 and 73 and the source of supply of current 123, so that whenever the brush 63 connects the contacts 72 and 73, the electromagnet 126 will be energized and causes the separation of the contacts 124.

The connections between the slide or jaw 27 and the arm 62, which carries the brush 63 are such that raising of the jaw depresses the brush 63 and, therefore, the larger the article, the lower will be the position of the brush 63 when the article is in the calipering device.

The pairs of contacts 72 and 73 being set in graduated arrangement, it will be apparent that the brush 63 will travel around until it engages the pair of contacts corresponding to the particular size of the article that happens to be in the calipering device. When the brush 63 of any calipering device engages a particular pair of contacts 72 and 73, the cam 45 associated therewith is tripped and as the levers 43 of this particular calipering device is lifted by the cam, the article will be ejected into the adjacent chute 120. By this arrangement, the largest articles are thrown out first. In practise, it is customary to assort the articles into various lots that are usable and two additional lots that are not usable, one being oversize articles and the other being undersize articles. Therefore, it is desirable to have the first pair of contacts 72 and 73 so set as to effect the discharge of all oversize articles and to have the undersize articles ejected last. In the case of undersize articles, however, the electromagnets 118 and 126 may be eliminated and the cam 45 set to open the jaws of all of the calipering devices as they pass over.

After the brush 63 leaves a pair of contacts 72 and 73, the corresponding electromagnet 126 will be de-energized and the circuit again completed through the contacts 124 so as to energize the mating electromagnet 118. The shaft 46 should then be turned so as to restore the cam 45 to its normal position with the flat surface 119 upward and with the arm 116 in position to be held by the electromagnet 118, and for this purpose, I have provided a series of pins 127 on the periphery of the table 15, which, as the table revolves, are adapted to engage with arms 128 on the inner ends of the shafts 46 and by lifting these arms, restore the shafts 46 to their normal position.

From the foregoing, it will be seen that each calipering device is adapted to receive any article within the range of the machine and to cooperate with any one of the assorting devices for discharging the article into its proper receptacle. It will also be seen that the graduations in the size of the articles may be closely regulated by adjusting the height of the contacts 72 and 73.

While I have illustrated my invention as embodied in a machine for assorting rollers for bearings, it will be apparent that the principles of the invention are applicable to machines for assorting other articles and I, therefore, wish to claim all such modifications and adaptations of the invention as are comprised within the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In a machine of the class described, the combination of an article-calipering device adapted to hold the article and comprising a movable member, the position of which is determined by the size of the article, and a plurality of devices with which said member is adapted to cooperate in succession, each of said devices having operative connection with said calipering device independent of said member and being adapted to effect the release of the article and the actuation of each of said plurality of devices being subject to control by said member when in a particular position.

2. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a movable member, the position of which is determined by the size of the article, a plurality of devices with which said member is adapted to cooperate in succession and the actuation of each of which is subject to control by said member when in a particular position, each of said plurality of devices having operative connection with said calipering device independent of said member, and means associated with said calipering device for ejecting the article therefrom when so released.

3. In a machine of the class described, the

combination of a movable article-calipering device adapted to carry the article and comprising a movable member, the position of which is determined by the size of the article, and a plurality of devices, each of which is adapted to effect the release of the article and comprises means with which said member is adapted to cooperate, each of said plurality of devices having operative connection with said calipering device independent of said member and the said means of the different devices being in relatively stepped arrangement so that said member will cooperate with each thereof when in a particular position.

4. In a machine of the class described, the combination of a revolving article-calipering device adapted to carry the article and comprising a movable member, the position of which is determined by the size of the article, and a plurality of relatively stationary devices arranged around the path of said calipering device, each of which is adapted to effect the release of the article and comprises means with which said member is adapted to cooperate, each of said plurality of devices having operative connection with said calipering device independent of said member and the said means of the different devices being in relatively stepped arrangement so that said member will cooperate with each thereof when in a particular position.

5. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a movable member, the position of which is determined by the size of the article, a plurality of electro-magnetic devices, each of which is adapted to effect the release of the article and comprises means with which said member is adapted to contact and thereby cause the actuation of the device, the said means of the different devices being in relatively stepped arrangement so that the contact of said member therewith will be in accordance with the position of the member as determined by the article.

6. In a machine of the class described, the combination of a movable article-calipering device adapted to grip and carry the article and comprising a movable member, the position of which is determined by the size of the article, a plurality of devices, each of which is adapted to effect the release of articles and comprises means with which said member is adapted to co-act to cause the actuation of the device, each of said plurality of devices having operative connection with said calipering device independent of said member and the said means of the different devices being in relatively stepped arrangement so that said member will co-act with but one thereof for each of its positions as determined by the article.

7. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a member the position of which is determined by the article, means for automatically feeding the article to said device, means for accurately positioning the articles in said device, and a plurality of devices selectively controlled by said member and each having an operative connection with said calipering device independent of said member whereby it is adapted to effect the release of articles of a particular size.

8. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a member the position of which is determined by the article, means for accurately positioning the article in said device, and a plurality of devices selectively controlled by said member and each having an operative connection with said calipering device independent of said member whereby it is adapted to effect the release of articles of a particular size.

9. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a member the position of which is determined by the article, and a plurality of devices selectively controlled by said member and each having an operative connection with said calipering device independent of said member whereby it is adapted to effect the release of articles of a particular size.

10. In a machine of the class described, the combination of a movable article-calipering device adapted to grip and carry the article, means normally tending to eject the article from said device, means for accurately positioning the article in said device, means for automatically effecting the release of the article so that said ejecting means can force the article against said positioning means, and a plurality of devices selectively actuated by said calipering device and each adapted to effect the release of articles of a particular size.

11. In a machine of the class described, the combination of a movable article-calipering device adapted to grip and carry the article and comprising a member the position of which is determined by the article, means for automatically feeding the articles to said device, means for automatically opening said device to receive articles from said feeding means, means for automatically positioning the article in said device, and a plurality of devices selectively controlled by said member and each having an operative connection with said calipering device independent of said member whereby it is adapted to effect the release of articles of a particular size.

12. In a machine of the class described, the combination of a movable article-calipering device adapted to grip and carry the article and comprising a member the position of which is determined by the article, means for automatically feeding the article to said device, means for automatically opening the calipering device to receive the article from said feeding means, and a plurality of devices selectively controlled by said member and each having an operative connection with said calipering device independent of said member whereby it is adapted to effect the opening of said calipering device to release articles of a particular size.

13. In a machine of the class described, the combination of a movable article-calipering device adapted to grip and carry the article, means for automatically feeding the articles to said device, means for accurately positioning the article in said device, means for automatically opening said device to receive the article from said feeding means, means for automatically opening said device to permit the article to be accurately positioned therein, and a plurality of devices selectively actuated by said calipering device and each adapted to effect the release of articles of a particular size.

14. In a machine of the class described, the combination of means adapted to grip and carry the article, rotatable means adapted to carry the article into position to be fed to said device, a rotating cam, and means actuated by said cam to transfer the article from said rotating means to said carrying means.

15. In a machine of the class described, the combination of means adapted to grip and carry the article, a spring-pressed plunger cooperating with said means and normally tending to eject the article therefrom, rotating means adapted to carry the article into position to be fed to said carrying means, a rotating cam, and means actuated by said cam for transferring the article from said rotating means into said carrying means against the action of said plunger.

16. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a movable member the position of which is determined by the size of the article, means for opening said calipering device to release the article, a movable cam for actuating the last-mentioned means, and electromagnetic means for controlling the positioning of said cam.

17. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a movable member the position of which is determined by the size of the article, means for opening said calipering device to release the article, a movable cam for actuating the last-mentioned means, electromagnetic means for controlling the positioning of said cam, and means carried by said member and cooperating with said electromagnetic means and controlling the actuation thereof.

18. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a movable member the position of which is determined by the size of the article, means for opening said calipering device to release the article, a movable cam for actuating the last-mentioned means, electromagnetic means for controlling the positioning of said cam and comprising relatively stationary contact means, and means carried by said member and adapted to cooperate with said contact means and thereby control the actuation of said electromagnetic means.

19. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a movable member the position of which is determined by the size of the article, means for opening said calipering device to release the article, a plurality of movable cams serially arranged along the path of said calipering device and each adapted to actuate the last-mentioned means, and electromagnetic means for controlling the positioning of said cams.

20. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a movable member the position of which is determined by the size of the article, means for opening said calipering device to release the article, a plurality of movable cams serially arranged along the path of said calipering device and each adapted to actuate the last-mentioned means, electromagnetic means for controlling the positioning of said cams, and means carried by said member and cooperating with said electromagnetic means to selectively control the actuation of said means in accordance with the position of said member.

21. In a machine of the class described, the combination of a movable article-calipering device adapted to carry the article and comprising a movable member the position of which is determined by the size of the article, means for opening said calipering device to release the article, a plurality of movable cams serially arranged along the path of said calipering device and each adapted to actuate the last-mentioned means, electromagnetic means for controlling the positioning of said cams and comprising relatively stationary contact means, and means carried by said member and selective-

ly cooperating with said contact means to control the actuation of the respective electromagnetic means in accordance with the position of said member.

22. In a machine of the class described, the combination of a movable article-carrier, a movable cam for actuating said carrier to release the article therefrom, means for moving said cam, electromagnetic means for normally holding said cam in inoperative position, electromagnetic means for breaking the circuit of the first-mentioned electromagnetic means, and means associated with said article-carrier for controlling the second-mentioned electromagnetic means.

In testimony whereof I affix my signature.

JOHN F. FLAHERTY.