Feb. 28, 1939. J. D. LORD 2,148,092

COUNTING DEVICE

Original Filed Sept. 4, 1929 4 Sheets-Sheet 1

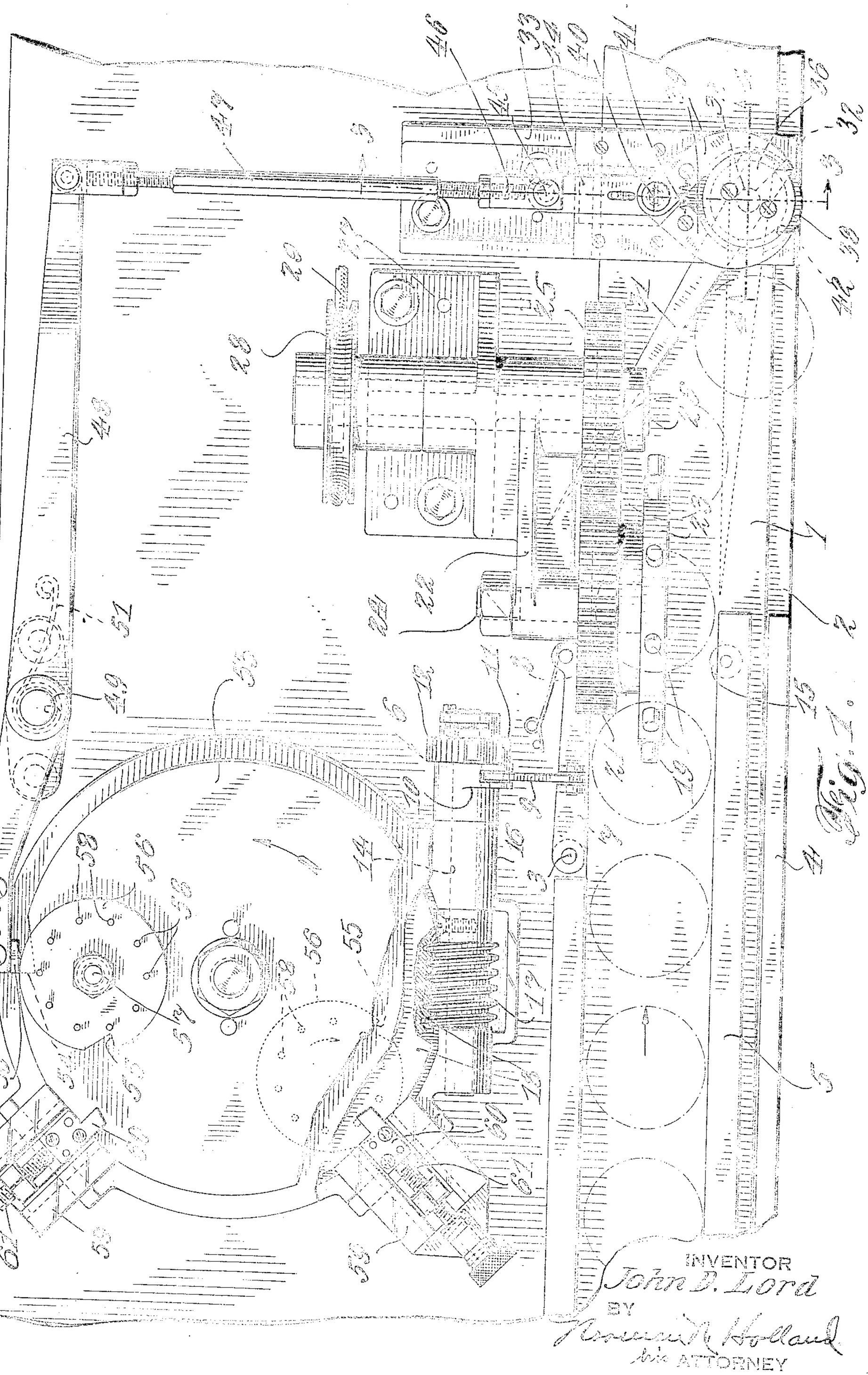

Fig. 1.

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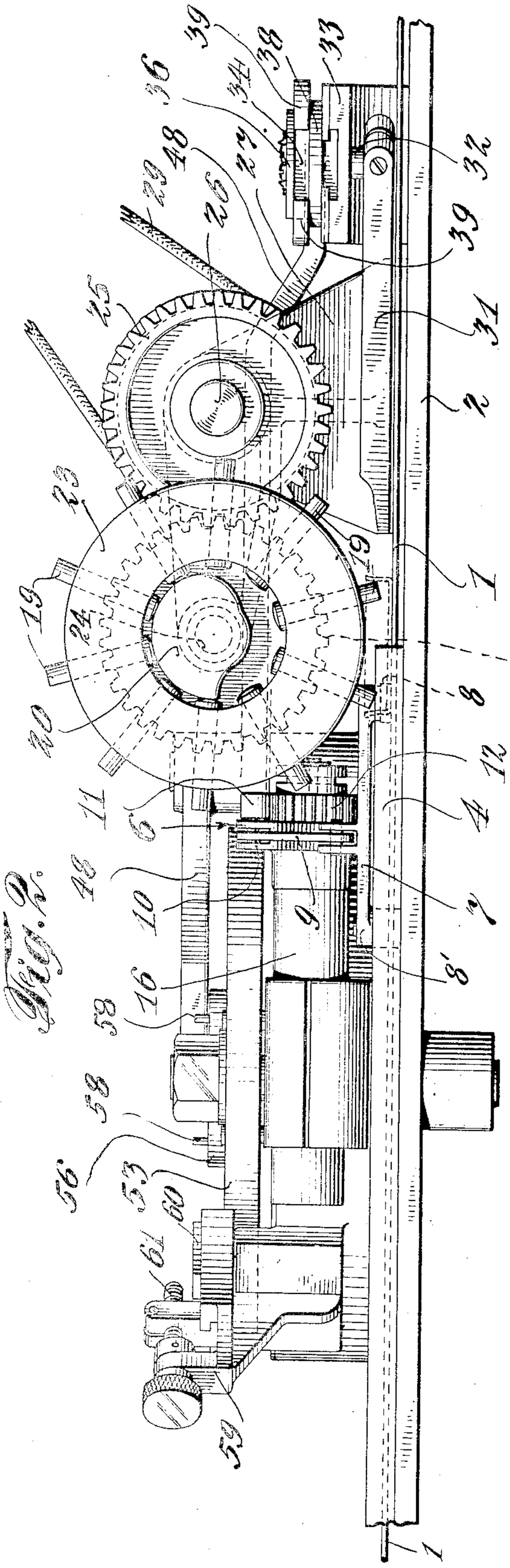

Fig. 2.

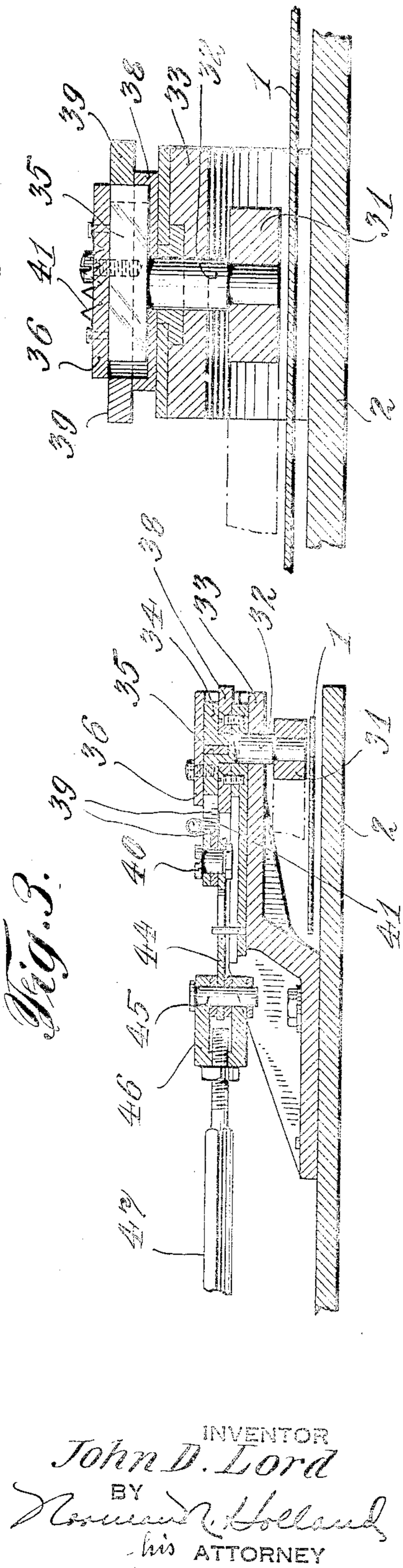

Fig. 3.

Fig. 4.

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COUNTING DEVICE

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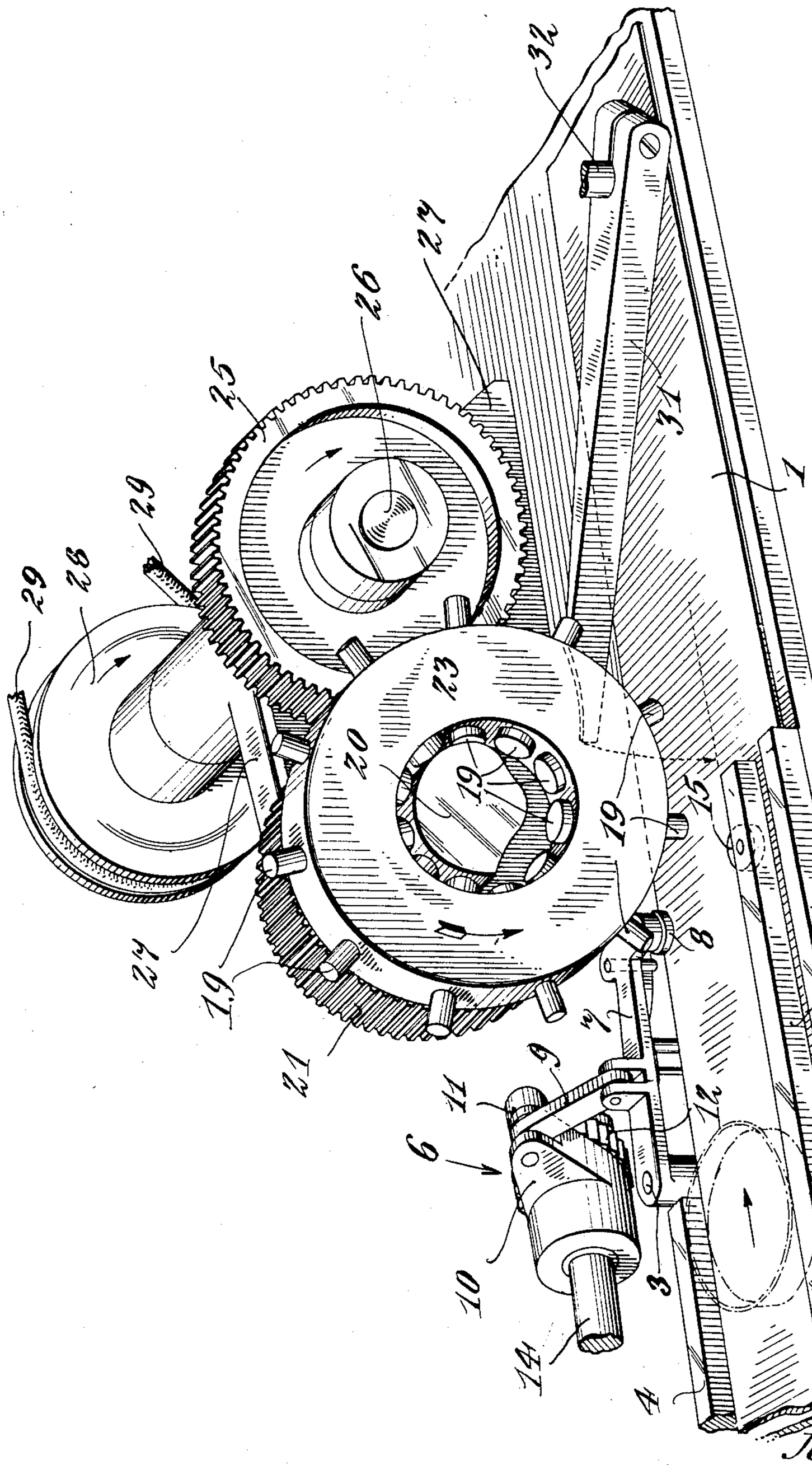

Fig. 5.

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Fig. 6.

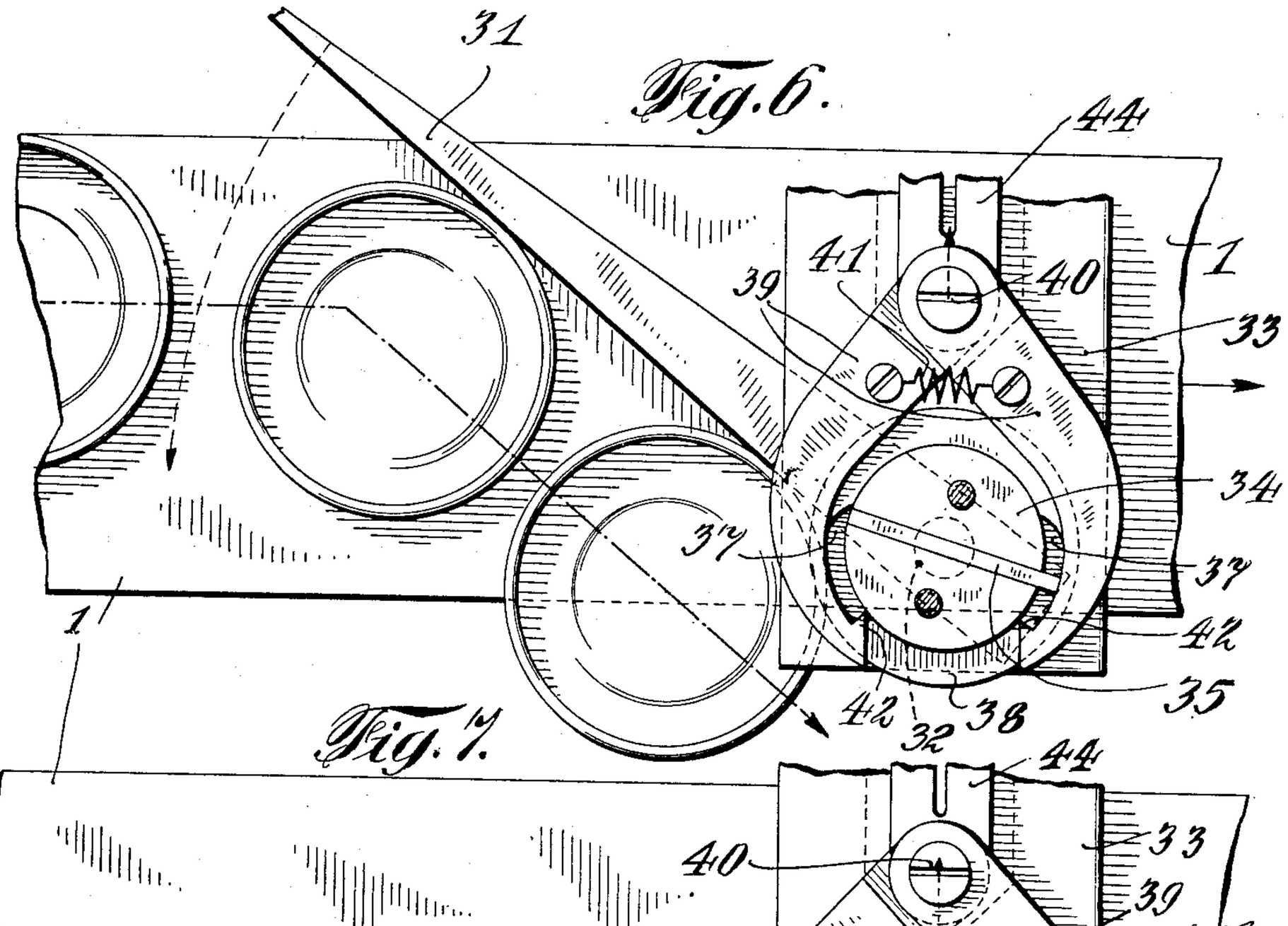


Fig. 7.

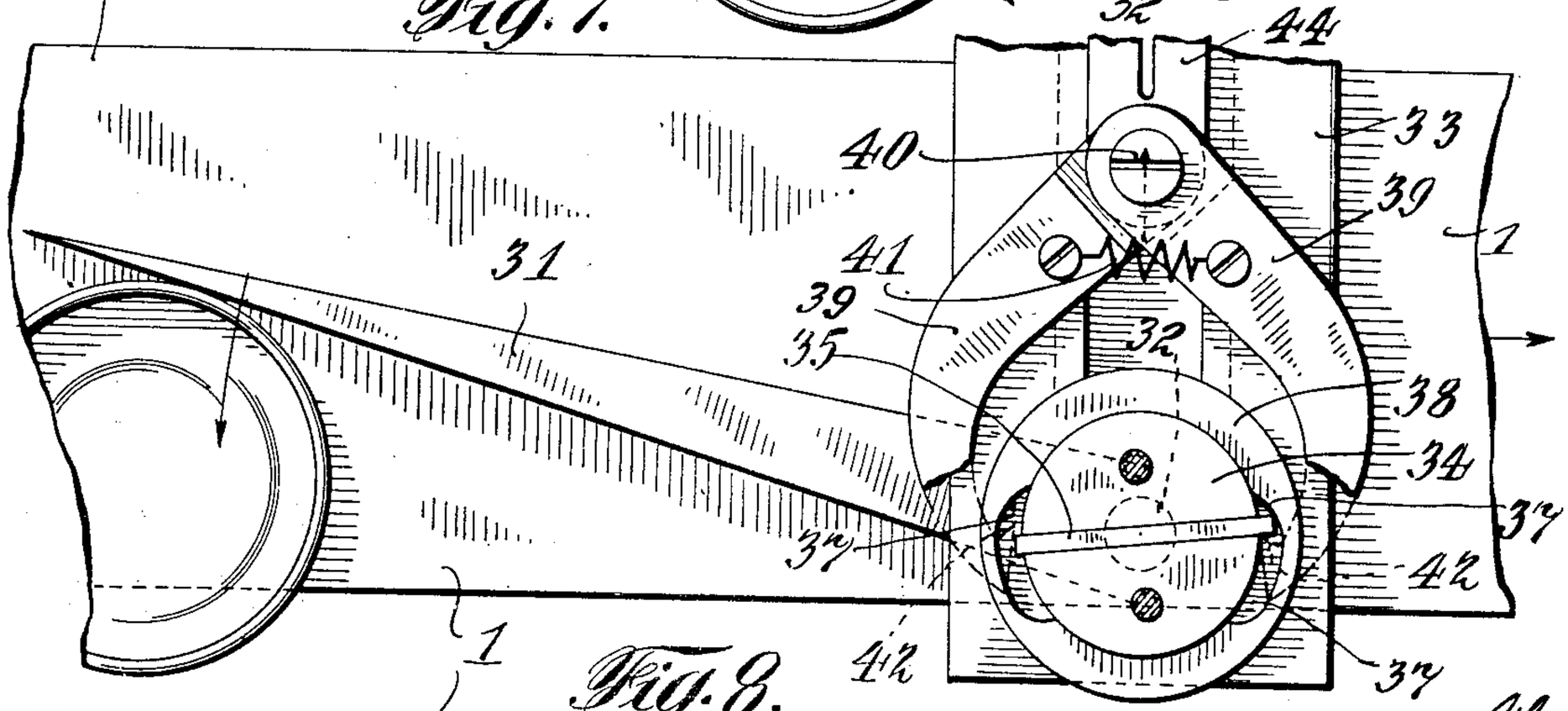
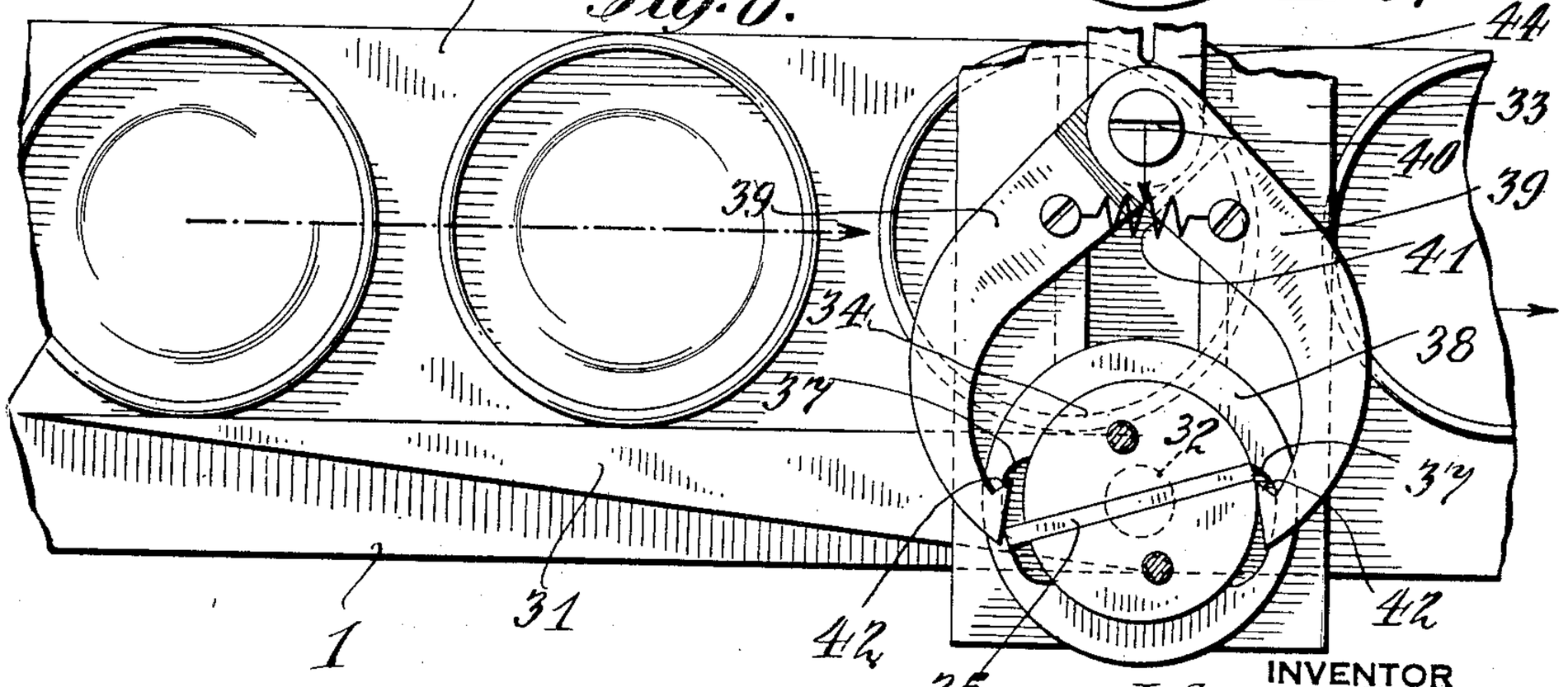


Fig. 8.



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2,148,992

COUNTING DEVICE

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Application September 4, 1929, Serial No. 390,263
Renewed August 5, 1938

18 Claims. (Cl. 235—98)

The present invention relates more particularly to counting devices for articles such as closure caps and the like, although many of its features are applicable to counting and delivery devices generally.

A number of articles, such as closure caps and the like, are sold in large quantities, usually by the gross or by the thousand. The profit from such articles, due to keen competition, is relatively small and, hence, it is impractical to have laborers count the articles by hand because of the cost and because of errors likely to occur. Ordinary counting mechanisms cannot be applied to the machines to register the number of caps by the number of operations of the stamping or assembling machine because of the cost and because of errors likely to occur. Ordinary counting mechanisms cannot be applied to the machines to register the number of caps by the number of operations of the stamping or assembling machine because a number of articles may be rejected by the inspector as they pass along the conveyor after having been delivered by the machine. In addition, the assembling machine, at times, runs idle due to the failure on the part of other mechanisms to supply caps or liners thereto. Counting mechanisms cannot readily be applied directly to the caps to ascertain their number because the caps vary in size and in height and, ordinarily, do not permit of nesting. The most common way of getting the quantity at the present time is to weigh the caps allowing so many pounds to a gross and so many pounds to a thousand. Such a method is, at best, an approximation. The manufacturer, as a precaution, adds extra caps to each box to be sure of having at least the number billed to the customer.

The present invention aims to overcome these difficulties by accurately counting the caps or other articles as they are delivered from the machine. In addition, the present invention automatically changes the delivery of the caps from one shipping box to another so that the filled boxes may be removed leisurely. In other words, one does not have to watch the counting device to remove the box to which the caps are being delivered at the exact time when the desired number of articles have been delivered.

An object of the present invention is to provide an inexpensive counting mechanism for articles such as closure caps and the like.

Another object of the invention is to provide a counting device readily applicable to existing machines without material changes therein.

Another object of the invention is to provide a counting mechanism automatically operative to deliver a predetermined number of articles into a shipping carton and thereafter to deliver the articles to another carton.

Another object of the invention is to positively move the caps along the conveyor, thereby to prevent clogging thereof due to engagement with the counting mechanism or due to other contingencies which may arise.

A further object of the invention is to provide a construction having a minimum number of rugged parts arranged to eliminate repair and to withstand the rough usage to which they may be subjected.

Other and further objects will be obvious upon an understanding of the illustrated embodiment about to be described or will be indicated in the appended claims, and various changes not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings wherein,

Fig. 1 is a partial top plan view of a preferred embodiment of the construction;

Fig. 2 is a side elevational view of the mechanism shown in Fig. 1;

Fig. 3 is a section along the line 3—3 of Fig. 1, illustrating details of the shifting mechanism;

Fig. 4 is a sectional view along the line 4—4 of Fig. 1, illustrating details of the shifting mechanism;

Fig. 5 is a perspective view illustrating the counting mechanism;

Fig. 6 is a detailed elevational view, partly in section, of the shifting mechanism, illustrating the mechanism in effective position to intercept the caps and deliver them to a shipping carton;

Fig. 7 illustrates the positions of the parts when the deflector is in an intermediate position; and

Fig. 8 illustrates the mechanism with the deflector in ineffective position.

In the manufacture of closure caps, it is usually customary to stamp out the blanks for the caps from decorated sheets of tin plate. These blanks may later be rolled into their required shape and assembled with liners or gaskets ready to be applied to containers. The caps in their final form are usually delivered by a conveyor to a desirable storage box or shipping carton. A convenient form of conveyor is illustrated as a part of the mechanism shown more particularly

in Figs. 1, 2 and 5, and may comprise a belt 1 passing over a substantially flat support 2 having upstanding guideways 4 at the edges thereof. An adjustable guide 5 may be provided to extend over a portion of the belt so that the effective width of the conveyor may be controlled to facilitate transfer of the caps.

The preferred embodiment contemplates mounting on the conveyor a counting device 6 having an arm 7 with a roller 8 thereon adapted to engage each cap as it passes along the conveyor so that the arm 7 oscillates with the passage of each cap. The arm 7 is shown pivoted to the stationary part of the conveyor at 3. A link 9 is pivotally connected at its respective ends to the center of the arm 7 and to an arm 10 on the counting device 6. The arm 10 carries a pawl 11 resting upon a ratchet 12 rigidly connected to a shaft 14. Each cap on the conveyor must pass between the roller 8 on the arm 7 and a roller 15 on the other side of the conveyor. The movement of the cap between these two rollers presses the arm 7 outwardly which moves the link 9, pawl 11 and ratchet wheel 12 to rotate the shaft 14 a predetermined amount upon the passage of each cap. The shaft 14 is housed in a sleeve 16 and has mounted thereon a worm 17 meshing with a gear 18. In this manner, the gear 18 is rotated a predetermined amount by means of the pawl and ratchet mechanism upon the passage of each cap along the conveyor. A more detailed description of the gear 18 and its associated mechanism for shifting the caps from one carton to another will be described hereinafter.

Due to the fact that closure caps and similar articles are made from thin metal, their weight is slight and any obstruction in the path of the caps will cause an entire line of caps to slip on the conveyor without moving forward; hence, an obstruction such as the rollers 8 and 15, associated with the counting device, will ordinarily interfere with the proper delivery of the caps. In order to avoid this, there is pivoted a rotatable member 23 which is here shown rotating in a vertical plane, although it will be clear that it might also rotate in a horizontal plane. There are, projecting from the periphery of the member 23, a series of spokes or pins 19. These pins are adapted to engage the skirt of the cap, the cap being in inverted position, and pull it through the rollers 8 and 15. A stationary cam 20 engages the heads of the pins 19 and holds them in position. As shown, the lower side of the cam is cut away so that the several pins on the lower part of the rotatable member 23 are free to move in a radial direction; hence, these pins, if they should not engage a cap properly, will immediately be moved upward so that the particular pin does not mar the cap or other article in any way. The next succeeding pin will engage the skirt properly and force it through. It will be understood that the pins are movable only in response to a force applied to the ends thereof and, hence, when the sides of the pins engage the caps, the caps are forced along the conveyor. Any pins which are forced radially inward upon engagement with the caps are pressed to their outward position as they move over the cam 20, as shown more particularly in Figs. 2 and 5. The pins, when they reach the caps, are always in their extended position.

Any suitable means may be provided, for rotating continuously the member 23, as shown herein, it is associated with a gear 21 mounted on an arm 22 by means of a bolt 24. A second gear 25 is mounted on a shaft 26 supported by a sleeve in bracket 27 bolted to the framework. The gear 25 meshes with the gear 21 and may be driven by a pulley 28 and belt 29. In this manner, the member 23, with the protruding pins 19, is rotated continuously by gears 21, 25, shaft 26 and pulley 28.

It is not sufficient that the mechanism merely count the number of caps because that would necessitate someone being present at the instant the proper number of caps had been delivered in order to substitute a different carton; otherwise, the counting operation would be futile. The present mechanism eliminates this difficulty by providing a deflector 31 extending at an angle to the belt, as shown in Fig. 1, so that the caps moving on the belt are deflected as shown. By changing the position of the deflector from that shown in Figs. 1 and 6 to that shown in Fig. 8, the caps will continue along the conveyor and be delivered at another point where an empty box may be positioned. In other words, the supply of caps to one box will be terminated by shifting the position of the deflector 31.

The mechanism for effecting this operation is shown more particularly in Figs. 1, 3, 4, 6, 7 and 8. The deflector 31 is suspended from a bracket 33 by means of a vertical pin or shaft 32, the upper end of which is in the form of substantially a circular disc 34. A pin 35 (Figs. 3 and 6 and 8) extending diametrically through the disc 34, may be held in position by a cover 36. The pin 35 is slightly longer than the diameter of the disc 34. Suitable cam surfaces 37 are provided in a member 38 upon which the jaws 39 rest.

Referring more particularly to Figs. 6, 7 and 8, it will be noted that, when the deflector 31 is in the position shown in Fig. 6, one of the cam surfaces 37 forces the pin to project upon the opposite side of the disc 34 and, when the deflector is moved into the position shown in Fig. 8, the end of the pin projecting outwardly engages the other cam surface 37 and is forced to project on the opposite side of the disc 34. A pair of jaws 39, pivoted at 40 and resiliently retained about the disc member 34 by means of a spring 41, have a pair of hooks 42 on the ends thereof. The joined ends of the jaws are attached by means of a small bar 44, pin 45, and member 46 to a rod 47. The other end of the rod 47 is pivotally connected to the end of a lever 48 (see Fig. 1) which in turn, is pivoted at 49 with a member 50 at its other end adapted to engage the periphery of a disc member 53 attached to the rotating gear 18 by means of suitable pins adjacent the center thereof. The gear 18 and disc member 53 rotate as a unit. The member 50 is resiliently retained against the surface of the member 53 by means of a leaf spring 51. It will be observed that, if the rod 47 is moved upwardly in Fig. 1, the hooks 42 on the jaws 39 will engage the pin 35 and rotate the deflector from the position shown in Fig. 6 to that shown in Fig. 8. When the deflector reaches that position, the cam surface 37 will have engaged the protruding end of the pin 35 and forced it inwardly to protrude on the other side of the disc member 34. The outer ends of the jaws are shaped so that when the rod 47 is returned to its original position, one of the jaws will engage and slide over the pin to be in position to engage the pin when the rod is again moved in the same direction; whereupon, the deflector will be moved from the position shown in Fig. 8 back to that shown in Fig. 6, and the pin 35 will slide from the position

shown in Fig. 8 to that shown in Fig. 6. In this manner, the cycle is repeated and the deflector 31 may be moved from one position to another by successive pulls in the same direction on the rod 47.

The means for effecting the operation of this mechanism and for changing the position of the rod 47 is shown more particularly in Fig. 1. The member 53 attached to gear 18 has a small depression or slot 54. When the member 53 has been rotated by the passage of the caps to a point where the member 50 on the lever 48 registers with the slot 54 therein, the spring 51 pulls the rod 47 upwardly and operates the deflector 31, as described hereinbefore. As the member 53 continues to rotate, the member 50 and lever 48 are moved back to their original position and the rod 47 is returned to its original position.

One or more notches 54 in the periphery of the wheel 53 is sufficient to operate the mechanism. In order, however, to decrease the size of the parts and to afford greater flexibility, it is desirable that the deflector operate only after the member 53 has made several revolutions. For example, if one revolution of the member 53 designates five hundred caps, it would be desirable that the member 53 make about ten or twelve revolutions to deliver about five or six thousand caps to the carton in accordance with present practice.

There is provided on the rotatable member 53 a second rotatable member 56 attached thereto by bolt 57 and adapted to rotate with and independently of the member 53. This member 56 likewise has a notch or slot 55 corresponding to the slot 54 in the member 53. A series of pins 58 are inserted in the upper surface of the member 56 for engagement with co-operating devices 59 for rotation thereof. Such co-operating means may be one or more in number, here shown as two, and may be positioned adjacent the periphery of the member 53. As shown herein, the devices 59 are attached to the stationary part of the frame and have a member 60, adjustable in position by means of the screw 61 which may be rotated manually. By positioning the member 60, as shown in Fig. 1, so that it engages one of the projections or pins 58 in the upper surface of the member 56, the member 56 is rotated the distance of one pin while passing each of the members 59, as shown in dotted lines in Fig. 1. If only one of the members 59 are adjusted for effective operation, then the wheel 53 has to rotate ten times in order for the wheel 56 to rotate once. The wheel 56 is so positioned that, normally, it covers the slot 54 in the member 53; hence, the lever 48 and member 50 do not drop into the slot 54 until the slots 54 and 55 register. By utilizing two or more of the members 59 for rotating the member 56, the number of caps may be increased or decreased in the respective cartons to which they are being delivered. It will be understood also that the member 56 may be quickly changed, if desired, and another member with a different number of pins substituted to deliver the proper number of caps.

In the operation of the device, the mechanism may be attached to the ordinary conveyor by attaching the counting mechanism thereto and properly positioning the arm 7 thereof. The caps, as they pass the counter, are forced between the rollers 15 and 8 by means of the rotating member 23 and the pins 19 which engage the respective caps as they present themselves. The rotatable member 23 is continuously driven by means of gears 21, 25, shaft 26 and pulley 28. The member 7 oscillates the arm 10 by means of the link 9 which, in turn, operates the pawl and ratchet mechanism 11 and 12 to rotate the shaft 14, worm 17, gear 18 and rotatable member 53. The rotation of the member 53 presents one of the pins 58 on the disc 56 mounted on the rotatable member 53 to the stationary projection 60 on the mechanism 59 to rotate the member 56 a predetermined amount upon each rotation of the member 53. When the member 56 has made a complete revolution, the slot 55 therein registers with the slot 54 in the member 53 so that the lever 48 is operated by means of the member 50 thereon dropping into the slot or dwell in the member 53. This pulls the rod 47 which causes the jaws 39 to engage alternately one end of the pin 35 and then the other, to oscillate the deflector 31 from the position shown in Fig. 6 to that shown in Fig. 8 and back to the position shown in Fig. 6. The cam surfaces 37 are effective to move the pin upon each oscillation of the member 31 so that the alternate jaw members 39 engage it on successive operations of the levers 47 and 48. In this manner, after a predetermined number of caps are delivered to a carton or container, the deflector 31 is oscillated so that the caps are diverted to another carton, permitting the operator to remove the filled carton at his leisure.

It will be seen that the present invention provides a counting mechanism which may be readily attached to existing machines for counting closure caps or other articles. The device operates effectively upon articles movable on a conveyor. The mechanism may be readily adjusted to accommodate changes in the size or height of the articles to be operated upon. The device is simple in construction, easy to operate and made from a minimum number of rugged parts. There are no delicately operated parts requiring frequent adjustment.

As various changes may be made in the form, arrangement and construction of the various parts without departing from the spirit of the invention, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. In a device of the class described, the combination of a conveyor moving in a substantially lineal direction for delivering closure caps in inverted position, a counting mechanism, and means mounted above the conveyor for engaging the inner side of each cap for forcing it into operative relation with said counting mechanism while moving forward upon said conveyor.

2. In a device of the class described, the combination of a horizontal conveyor for delivering articles having an upwardly extending portion, a counting mechanism, and rotatable means having members projecting therefrom for engaging the upwardly extending portion of each article and forcing the articles forward along said delivery means into operative relation with said counting mechanism.

3. In a device of the class described, the combination of a horizontal member adapted to support and deliver articles, a counting mechanism, and rotatable means having members projecting therefrom for engaging and forcing the articles in the plane in which said delivery means are moving and into operative relation with said

counting mechanism, said members being movable substantially radially of said rotatable member so that, upon improper engagement with said articles, said members move inwardly without marring the articles.

4. In a device of the class described, the combination of means for delivering articles, a rotatable member mounted above the effective portion of said means for delivering articles, said rotatable member having a plurality of radially movable members projecting therefrom, and means for forcing said movable members to their outer position prior to their engagement with said articles.

5. In a device of the class described, the combination of means for delivering articles, a counting mechanism, and means comprising a rotatable member having a plurality of pins projecting from the outer periphery thereof, said pins being movable radially of said member upon engagement with a cap, and a cam for forcing said pins into their outer position prior to their engagement with caps.

6. In a device of the class described, the combination of means for forcing closure caps along a guideway, said means comprising a rotatable member, means for rotating said member, a plurality of members projecting from said rotatable member and radially movable with respect thereto, and means for forcing said members into their outer position prior to engagement with the caps.

7. In a device of the class described, the combination of means adapted to be actuated by a closure cap passing along a guideway, a rotatable member, devices responsive to said means for rotating said member a predetermined amount upon the passage of each cap, a second rotatable member mounted upon and positioned eccentrically with respect to said first member, and means for rotating said second rotatable member for each complete revolution of said first rotatable member.

8. In a counting device, the combination of a rotatable member, means for rotating said member a predetermined amount upon the delivery of each successive article such as a closure cap, a second rotatable member pivoted upon and adjacent to the periphery of said first rotatable member, and means for rotating said second rotatable member a predetermined amount for each revolution of said first rotatable member.

9. In a device of the class described, the combination of a rotatable member having a recess therein, means for rotating said rotatable member a predetermined amount upon the delivery of each successive cap, a second rotatable member mounted on said first member having a substantially smaller circumference and having a recess therein, means for rotating said second rotatable member a predetermined amount for each revolution of said first rotatable member to bring the recesses in said rotatable member into registry upon the delivery of a predetermined number of caps.

10. In a device of the class described, the combination of a rotatable member, devices for rotating said member a predetermined amount upon the delivery of successive articles to be counted, a second rotatable member associated with said first rotatable member, a plurality of devices for engaging said second rotatable member to rotate said second rotatable member a predetermined amount upon each revolution of said first rotatable member, and means for rendering certain of said devices ineffective to change the rate of rotation of said second rotatable member.

11. In a device of the class described, the combination of a rotatable member, devices adapted to effect rotation of said member a predetermined amount upon delivery of successive caps, a second rotatable member mounted eccentrically upon said first member and adapted to be advanced once during each revolution of said first rotatable member, said rotatable members each having a recess in their peripheries adapted to register when a predetermined number of caps have been delivered.

12. In a device of the class described, the combination of a plurality of rotatable members each having a recess in the periphery thereof, one of said members being of smaller diameter and mounted eccentrically with respect to the other member so that the recesses will register at a point common to the circumference of both members, means for rotating said members in multiple relation while caps are being counted, and means adapted to co-operate with the recesses in said members when they have registered with each other.

13. In a device of the class described, the combination of a belt conveyor for delivering closure caps and the like, an arm extending partially across said conveyor having a roller thereon for engagement with the sides of successive caps, a counting device operatively connected to said arm for registering the number of oscillations thereof, and means for engaging the articles individually and forcing them into operative relation with said roller on said arm to operate said counting device.

14. In a device of the class described, the combination of a belt conveyor for delivering closure caps and the like, guide members on the sides of said conveyor, an arm extending partially across said conveyor, a counting device operatively connected to said arm for registering the number of oscillations thereof, a roller on one of said guide members opposite said arm to direct the caps towards said arm to effect the oscillation thereof, and means for engaging the inner sides of the caps and for positively moving them forward along said conveyor past said extending arm.

15. In a device of the class described, a counting mechanism comprising a rotatable member having a recess therein, a second rotatable member mounted eccentrically on said first member having a recess adapted to register with the recess in said first member, and means adapted to engage said recess when in a predetermined position once during every revolution of said second member.

16. In a device of the class described, the combination of a rotatable member having a recess in the periphery thereof, means for rotating said member in response to a cap delivered to said device, a recond rotatable member of smaller diameter than said first member having a portion of its periphery above the recess in said first member, said second member having a recess in the periphery thereof, and means for rotating said second member in the opposite direction from said first member, whereby said recesses will register once during each revolution of said second member when the latter is rotated.

17. In a device of the class described, the combination of a counting mechanism comprising a plurality of rotatable members each having a recess in the periphery thereof, one of said rotatable members being mounted eccentrically on the other of said member, means for rotating one of said members a predetermined amount for each cap delivered, and means for rotating the other of said members a predetermined amount for each revolution of said first member so that a recess in one of said rotatable members may register with a recess in the other when a predetermined number of caps have been delivered to said counting mechanism.

18. In a device of the class described, the combination of a conveyor moving in a lineal plane for delivering closure caps or similar articles having skirts, said caps being placed on said conveyor in inverted position so that the skirts extend upwardly, a counting mechanism, and means above said conveyor rotating in a substantially vertical plane having a plurality of radially extending projections adapted to extend into the caps to engage the inner side of the skirt of each cap individually and force the caps individually along said conveyor into operative relation with said counting mechanism.

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