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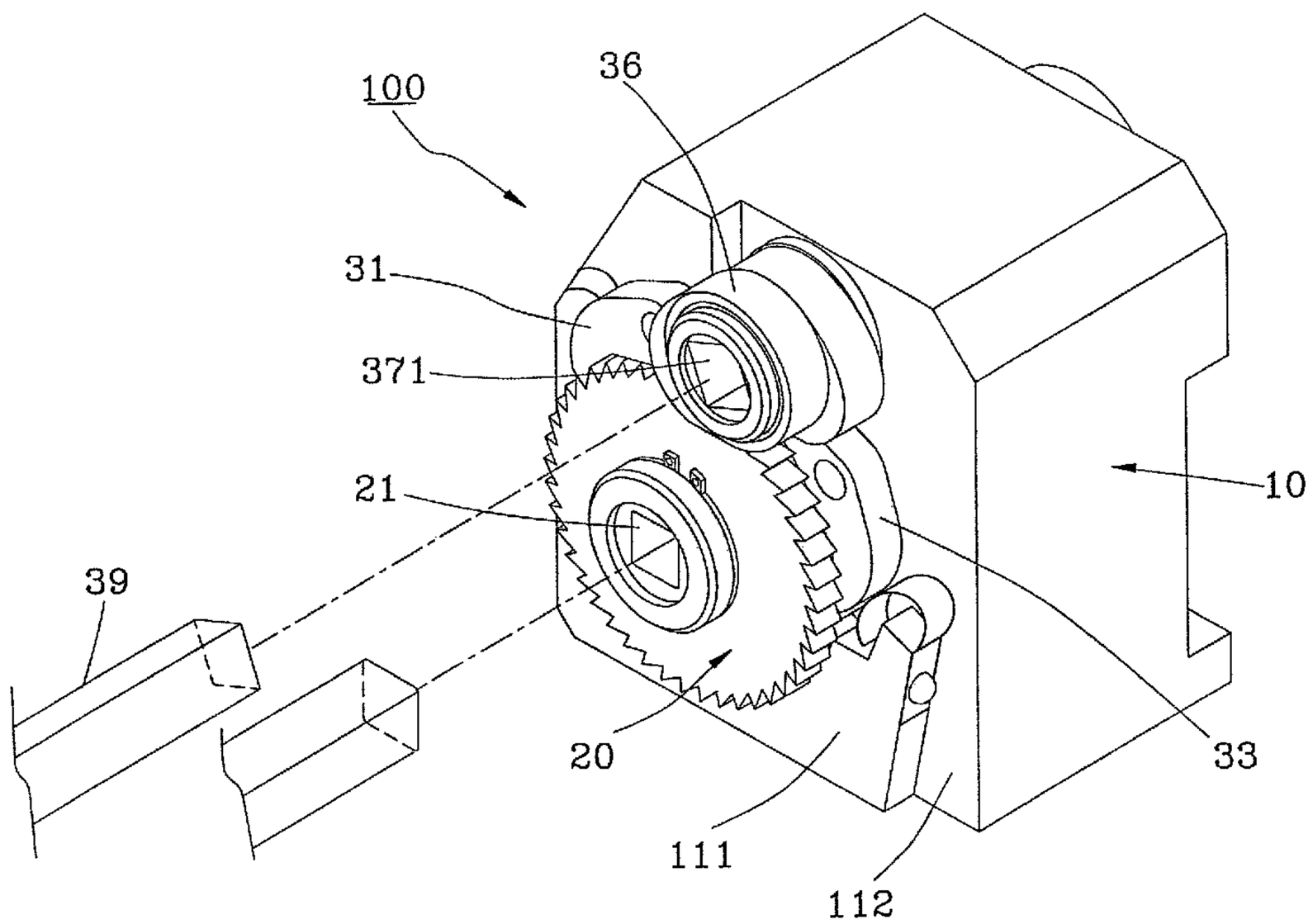
(54) Title: BLIND LIFT ROD CONTROL LOCK



(57) Abrégé/Abstract:
A blind lift rod control lock includes a housing having an axle hole, a rotating member revolvably mounted in the axle hole of the housing, the rotating member having a non-circular through hole, which receives a lift rod for enabling the rotating member to be synchronously rotated with the lift rod, a reverse ratchet, and a forward ratchet, and a locking mechanism. The locking mechanism has a follower member, a first hooked portion adapted to engage the reverse ratchet, and a second hooked portion adapted to engage the forward ratchet. The follower member is selectively controlled to force the first hooked portion into engagement with the reverse ratchet or the second hooked portion into engagement with the forward ratchet.

BLIND LIFT ROD CONTROL LOCK

ABSTRACT OF THE DISCLOSURE

A blind lift rod control lock includes a housing having an axle hole, a rotating member revolvably mounted in the axle hole of the housing, the rotating member having a non-circular through hole, which receives a lift rod for enabling the rotating member to be synchronously rotated with the lift rod, a reverse ratchet, and a forward ratchet, and a locking mechanism. The locking mechanism has a follower member, a first hooked portion adapted to engage the reverse ratchet, and a second hooked portion adapted to engage the forward ratchet. The follower member is selectively controlled to force the first hooked portion into engagement with the reverse ratchet or the second hooked portion into engagement with the forward ratchet.

BLIND LIFT ROD CONTROL LOCK

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to blinds and, more particularly, to a blind lift rod control lock for use in a blind assembly to lock the lift rod.

2. Description of the Related Art

A blind with hidden lift cord is known comprised of a headrail, a bottom rail, a set of blind slats, two lift cords, a frequency modulation mechanism, and a receiving mechanism. The frequency modulation mechanism and the receiving mechanism are installed in the headrail. The blind slats connected in parallel between the headrail and the bottom rail by ladder tapes. The lift cords each have one end connected to the receiving mechanism and the other end inserted through the blind slats and fastened to the bottom rail. The frequency modulation mechanism controls the tilting angle of the blind slats to regulate the amount of light passing through the blind. The receiving mechanism comprises a reversing spring, a lift rod, and two bobbins. The reversing spring is adapted to reverse the lift rod after the lift rod being rotated. The lift rod is rotated clockwise when the user lifting the bottom rail toward the headrail, or counter-clockwise when the user pulling the bottom rail downwards. The bobbins are fixedly mounted on the lift rod for synchronous rotation to roll up or let off the lift cords, for enabling the blind slats to be received or extended out. Normally, the reversing power of the reversing spring must be properly controlled. Excessive reversing power of the reversing spring may cause the lift rod to roll up the lift cords unexpectedly after the blind has been fully extended out, or may be unable to let the bottom rail be stopped at the desired elevation. Insufficient reversing power of the

reversing spring causes the reversing spring unable to rotate the lift rod to the desired angular position when the user lifting the bottom rail of the blind. During lifting of the bottom rail by the lift cords, the reversing power of the reversing spring must conquer the gravity weight of the bottom rail and the weight of the blind slats being received at the bottom rail. Insufficient reversing power of the reversing spring cannot bear the total weight of the bottom rail and the blind slats, and the bottom rail may be stopped in position lower than the expected elevation. Therefore, the set value of the reversing power of the reversing spring determines the smoothness of the receiving or extending operation of the blind. Further, the reversing spring starts to wear quickly with use, resulting in an elastic fatigue. In order to prolong the service life of the reversing spring, the ends of the reversing spring may be made relatively wider or thicker. However, this improvement cannot completely eliminate the reversing spring from elastic fatigue.

SUMMARY OF THE INVENTION

The present invention has been accomplished to provide a blind lift rod control lock, which eliminates the aforesaid drawbacks. It is therefore the main object of the present invention to provide a blind lift rod control lock, which locks the lift rod of the blind positively in position to accurately hold the bottom rail of the blind at the desired elevation.

To achieve this object of the present invention, the blind lift rod control block is coupled to the lift rod of a blind and adapted to lock the lift rod of the blind, comprising a housing having an axle hole; a rotating member revolvably mounted in the axle hole of the housing, the rotating member having a non-circular through hole, which receives the lift rod for enabling the rotating member to be synchronously

rotated with the lift rod, a reverse ratchet extended around the non-circular through hole and a forward ratchet extended around the non-circular through hole; and a locking mechanism having a follower member, a first hooked portion adapted to engage the reverse ratchet, and a second hooked portion adapted to engage the forward ratchet, the follower member being selectively controlled to force the first hooked portion into engagement with the reverse ratchet or the second hooked portion into engagement with the forward ratchet.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a blind lift rod control lock according to the present invention.

FIG. 2 is an exploded view of the blind lift rod control lock according to the present invention.

FIG. 3 is a front view of the blind lift rod control lock according to the present invention, showing the follower member moved to the second position.

FIG. 4 is a rear view of the blind lift rod control lock according to the present invention, showing the first stop face of the locating ring stopped at the first stop face of the housing.

FIG. 5 is a side view, partially in section, of the blind lift rod control lock according to the present invention.

FIG. 6 is a schematic drawing showing the blind lift rod control lock used with a frequency modulation mechanism according to the present invention.

FIG. 7 is a schematic drawing showing the blind lift rod control lock used with a switching mechanism according to the present invention.

FIG. 8 is a front view, partially in section, of the blind lift rod control lock,

showing the follower member moved to the first position according to the present invention.

FIG. 9 is another rear view of the blind lift rod control lock according to the present invention, showing the second stop face of the locating ring stopped at the second stop face of the housing.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Referring to FIG. 1, a blind lift rod control lock **100** is installed in the headrail of the blind (not shown) and coupled to the lift rod **1** of the blind. The lift rod **1** is rotated clockwise or counter-clockwise subject to the receiving or extending action of the blind.

Referring to FIGS. 2~5, the blind lift rod control lock **100** comprises a housing **10**, a rotating member **20**, and a locking mechanism **30**.

The housing **10** has a front side **11**, a back side **12**, an axle hole **13**, and a through hole **14**. The front side **11** has a flat first step **111** and a flat second step **112**. The first step **111** protrudes from the second step **112**. The back side **12** has a top protruding block **121**. The top protruding block **121** has a bottom side forming a first stop face **122** and a second stop face **123**. The axle hole **13** extends through the housing **10**, having one end terminating in an opening **113** in the front side **11** of the housing **10** between the first step **111** and the second step **112** and the other end cut through the back side **12**. The through hole **14** extends through the housing **10** in parallel to the axle hole **13**, having one end cut through the second step **112** and the other end cut through the back side **12** of the housing **10**. The first stop face **122** and the second stop face **123** are disposed at two sides of the through hole **14**.

The rotating member **20** is a cylindrical member inserted into the axle hole

13 for free rotation without axial displacement, having a rectangular axial through hole **21** coaxial to the axle hole **13**. The aforesaid lift rod **1** is a rectangular rod member fitted into the rectangular axial through hole **21** of the rotating member **20**. The rotating member **20** has one end extended out of the front side **11** of the housing **10** and fixedly provided with a forward ratchet **22** and a reverse ratchet **23** in front of the forward ratchet **22**. The forward ratchet **22** is disposed outside the second step **112** and partially protruding over the opening **113**. The reverse ratchet **23** protrudes over the first step **111**.

The locking mechanism **30** comprises a first pawl **31**, a first spring member **32**, a second pawl **33**, a second spring member **34**, two pivot bolts **35**, a follower member **36**, an axle bush **37**, a locating ring **38**, and a tilt rod **39**.

The first pawl **31** is pivoted to the first step **111** by one of the pivot bolts **35**, having two ends respectively terminating in a first hooked portion **311** and a first contact portion **312** far from the corresponding pivot bolt **35** at two sides. The first spring member **32** is a spring plate, having one end fixedly fastened to the housing **10** and the other end stopped against the first pawl **31**. The first spring member **32** imparts a downward pressure to the first pawl **31**, forcing the hooked portion **311** of the first pawl **31** into engagement with the reverse ratchet **23**. The second pawl **33** is pivoted to the second step **112** by the other of the pivot bolts **35**, having two ends respectively terminating in a second hooked portion **331** and a second contact portion **332** far from the corresponding pivot bolt **35** at two sides. As illustrated in FIG. 1, the first pawl **31** and the second pawl **33** do not interfere with each other, and the contact portion **312** of the first pawl **31** is supported on the contact portion **332** of the second pawl **33**. The second spring member **34** is a spring plate, having one end fixedly fastened to the housing **10** and the other end stopped against the second pawl **33**. The second spring

member **34** imparts a downward pressure to the second pawl **33**, forcing the hooked portion **331** of the second pawl **33** into engagement with the forward ratchet **22**.

The follower member **36** is a cylindrical member inserted through the through hole **14** and rotatable between a first position **P1** and a second position **P2** (this will be described further), having an axial center through hole **361** coaxial to the through hole **14**, a first bearing portion **362** disposed around the axial center through hole **361** at one end outside the front side **11** of the housing **10** corresponding to the contact portion **312** of the first pawl **31**, and a second bearing portion **363** disposed around the axial center through hole **361** behind the first bearing portion **362** corresponding to the contact portion **332** of the second pawl **33**. The first bearing portion **362** and the second bearing portion **363** are concentrically arranged cams that protrude in different directions.

The axle bush **37** is inserted into the axial center through hole **361** of the follower member **36**, having a rectangular axial center through hole **371** coaxial to the axial center through hole **361** of the follower member **36**. The locating ring **38** is fastened to the rear end of the axle bush **37** outside the back side **12** of the housing **10**, having a first stop face **381** and a second stop face **382** corresponding to the first stop face **122** and second stop face **123** of the top protruding block **121** of the housing **10**.

The tilt rod **39** is a rectangular rod fitted into the rectangular axial center through hole **371** of the axle bush **37** and rotatable clockwise/counter-clockwise by an external rotary driving force. Rotating the tilt rod **39** causes the axle bush **37**, the follower member **36** and the locating ring **38** to be rotated with the tilt rod **39**. It is to be understood that the locating ring **38** is not fixedly fastened to the follower member **36**. When one stop face (the first stop face **381** or second stop face **382**) of the locating ring **38** stopped against one stop face (the first stop face **122** or second stop face **123**)

of the top protruding block **121** of the housing **10** during rotary motion of the tilt rod **39**, one bearing portion (the first bearing portion **362** or second bearing portion **363**) of the follower member **36** is stopped against the corresponding pawl (the first pawl **31** or the second pawl **33**), and at this time the axle bush **37** is rotated with the tilt rod **39** relative to the follower member **36** and the locating ring **38**.

The above statement explains the structure of the parts of the blind lift rod control lock **100** and their relative positioning. The functioning and achievements of the blind lift rod control lock **100** are outlined hereinafter.

At first, the clockwise or counter-clockwise rotating control of the tilt rod **39** is explained. As shown in FIG. 6, the tilt rod **39** to which the axle bush **37** is coupled is a member of the frequency modulation mechanism **2** of the blind adapted to control the tilting angle of the blind slats. During frequency modulation, the follower member **36** and the locating ring **38** are respectively stopped against the corresponding pawl **31** or **33** and the housing **10** and prohibited from rotary motion at an early stage, however the tilt rod **39** and the axle bush **37** are continuously rotated to tilt the blind slats of the blind.

In the aforesaid example, the frequency modulation mechanism **2** drives the tilt rod **39**. Alternatively, a switching mechanism **200** may be used and coupled between the blind lift rod control lock **100** and the frequency modulation mechanism **2**. The switching mechanism **200** comprises a coupling device **201** coupled to the tilt rod **39**, a left lift cord **202**, and a right lift cord **203**. The lift cords **202** and **203** each have one end fixedly connected to the coupling deice **201** and the other end suspending outside the headrail of the blind. The user can pull the left lift cord **202** to rotate the tilt rod **39** clockwise, or pull the right lift cord **203** to rotate the tilt rod **39** counter-clockwise. When pulling the left lift cord **202** or the right lift cord **203**, the

follower member **36** and the locating ring **38** are simultaneously rotated with the tilt rod **39** and the axle bush **37** clockwise or counter-clockwise.

Alternatively, the tilt rod **39** can be made independent of the frequency modulation mechanism **2**, enabling the switching mechanism **200** to control the direction of rotation of the tilt rod **39**.

The locking control of the blind lift rod control lock **100** on the lift rod **1** is outlined hereinafter. FIG. 3 illustrates the tilt rod **39** rotated clockwise. At this time, as shown in FIG. 4, the first stop face **381** of the locating ring **38** is stopped at the first stop face **122** of the housing **10**, and the second bearing portion **363** of the follower member **36** is stopped against the contact portion **332** of the second pawl **33**, thereby causing the follower member **36** to be held in the second position **P2**. When the follower member **36** held in the second position **P2**, the hooked portion **331** of the second pawl **33** is disengaged from the forward ratchet **22**, and the hooked portion **311** of the first pawl **31** is forced by the first spring member **32** into engagement with the reverse ratchet **23** to stop the lift rod **1** from reverse rotation by the reversing spring of the blind (not shown), and therefore the lift rod **1** is locked, holding the bottom rail of the blind at the desired elevation.

FIGS. 8 and 9 show the status of the blind lift rod control lock **100** after reversed rotation of the tilt rod **39**. At this time, the second stop face **382** of the locating ring **38** is stopped at the second stop face **123** of the housing **10**, and the first bearing portion **362** of the follower member **36** is stopped against the contact portion **312** of the first pawl **31**, thereby causing the follower member **36** to be held in the first position **P1**. When the follower member **36** held in the first position **P1**, the hooked portion **311** of the first pawl **31** is disengaged from the reverse ratchet **23**, and the hooked portion **331** of the second pawl **33** is forced by the second spring member **34**

into engagement with the forward ratchet **22** to stop the lift rod **1** from rotation, and therefore the lift rod **1** is locked, holding the bottom rail of the blind at the desired elevation.

The direction of rotation of the aforesaid lift rod **1** is subject to the receiving or extending action of the blind. Therefore, when the user suddenly holding the bottom rail of the blind in position during up or down stroke of the bottom rail, the first or second pawl is forced into engagement with the corresponding ratchet to lock the lift rod **1**, and therefore the bottom rail is accurately positioned in position. In general, the invention eliminates the drawback of unstable positioning of the conventional designs due to excessive reversing power or elastic fatigue of the reversing spring.

WHAT IS CLAIMED IS:

1. A blind lift rod control lock coupled to a lift rod of a blind and adapted to lock the lift rod of the blind, the blind lift rod control lock comprising:

a housing having an axle hole;

a rotating member revolvably mounted in the axle hole of said housing and having a non-circular through hole, which receives said lift rod for enabling said rotating member to be synchronously rotated with said lift rod, a reverse ratchet and a forward ratchet extended respectively around a periphery of the rotating member; and

a locking mechanism having a follower member, a first hooked portion adapted to engage said reverse ratchet, and a second hooked portion adapted to engage said forward ratchet, said follower member being selectively controlled to force said first hooked portion into engagement with said reverse ratchet or said second hooked portion into engagement with said forward ratchet.

2. The blind lift rod control lock as claimed in claim 1, wherein said housing has a front side and a back side; said axle hole extends through the front side and back side of said housing; said rotating member is a cylindrical member inserted through said axle hole, keeping said non-circular through hole in a coaxial status relative to said axle hole; said forward ratchet and said reverse ratchet are located on one end of said rotating member around said non-circular through hole outside the front side of said housing.

3. The blind lift rod control lock as claimed in claim 2, wherein the front side of said housing has a first step, a second step, an opening in communication with one

end of said axle hole between said first step and said second step, said first step protruding over said second step; said forward ratchet is disposed outside said second step and partially protruding over the opening of the front side of said housing; said reverse ratchet protrudes over said first step.

4. The blind lift rod control lock as claimed in claim 3, wherein said locking mechanism comprises a first pawl fastened pivotally with said first step of said housing, said first pawl having one end forming said first hooked portion, and a second pawl fastened pivotally with said second step of said housing, said second pawl having one end forming said second hooked portion.

5. The blind lift rod control lock as claimed in claim 4, wherein said locking mechanism further comprises a first spring member controlled by said follower member to press on said first pawl and to further force said first hooked portion into engagement with said reverse ratchet, and a second spring member controlled by said follower member to press on said second pawl and to further force said second hooked portion into engagement with said forward ratchet.

6. The blind lift rod control lock as claimed in claim 5, wherein said housing further comprises a through hole extended through the front side and back side of said housing in parallel to said axle hole; said first pawl has a second end terminating in a first contact portion; said second pawl has a second end terminating in a second contact portion; said follower member is a cylindrical member inserted through the through hole of said housing and rotatable in the through hole of said housing between a first position and a second position, having a first bearing portion and a second bearing

portion formed in one end thereof outside the front side of said housing and, said first bearing portion being pressed on the contact portion of said first pawl when said follower member rotated to said first position, said second bearing portion being pressed on the contact portion of said second pawl when said follower member rotated to said second position.

7. The blind lift rod control lock as claimed in claim 6, wherein said follower member has an axial center through hole coaxial to the through hole of said housing and accommodating an axle bush, said axle bush having a non-circular axial center through hole, which receives a tilt rod for enabling said axle bush to be rotated clockwise/counter-clockwise with said tilt rod.

8. The blind lift rod control lock as claimed in claim 7, wherein the back side of said housing has a first stop face and a second stop face; a locating ring is mounted on one end of said axle bush outside the back side of said housing for synchronous rotation with said axle bush and said tilt rod, said locating ring having a first stop face corresponding to the first stop face of said housing and a second stop face corresponding to the second stop face of said housing, the first stop face of said locating ring being moved to stop against the first stop face of said housing during clockwise rotation of said locating ring with said axle bush and said tilt rod, the second stop face of said locating ring being moved to stop against the second stop face of said housing during counter-clockwise rotation of said locating ring with said axle bush and said tilt rod, said locating ring being stopped from rotary motion to hold said follower member in said second position when the first stop face of said locating ring is stopped against the first stop face of said housing, said locating ring being stopped from rotary

motion to hold said follower member in said first position when the second stop face of said locating ring is stopped against the second stop face of said housing.

9. The blind lift rod control lock as claimed in claim 8, wherein the first bearing portion and second bearing portion of said follower member are cams.

10. The blind lift rod control lock as claimed in claim 7, wherein said tilt rod has one end extended out of said housing and coupled to a frequency modulation mechanism, said frequency modulation mechanism being adapted to rotate said tilt rod to further control a tilting angle of slats of the blind in which the blind lift rod control lock is installed.

11. The blind lift rod control lock as claimed in claim 7, wherein said tilt rod has one end extended out of said housing and coupled to a switching mechanism, said switching mechanism comprising a coupling device coupled to said tilt rod, a left lift cord suspended from said coupling device for pulling by the user to rotate said tilt rod in clockwise direction, and a right lift cord suspended from said coupling device for pulling by the user to rotate said tilt rod in counter-clockwise direction.

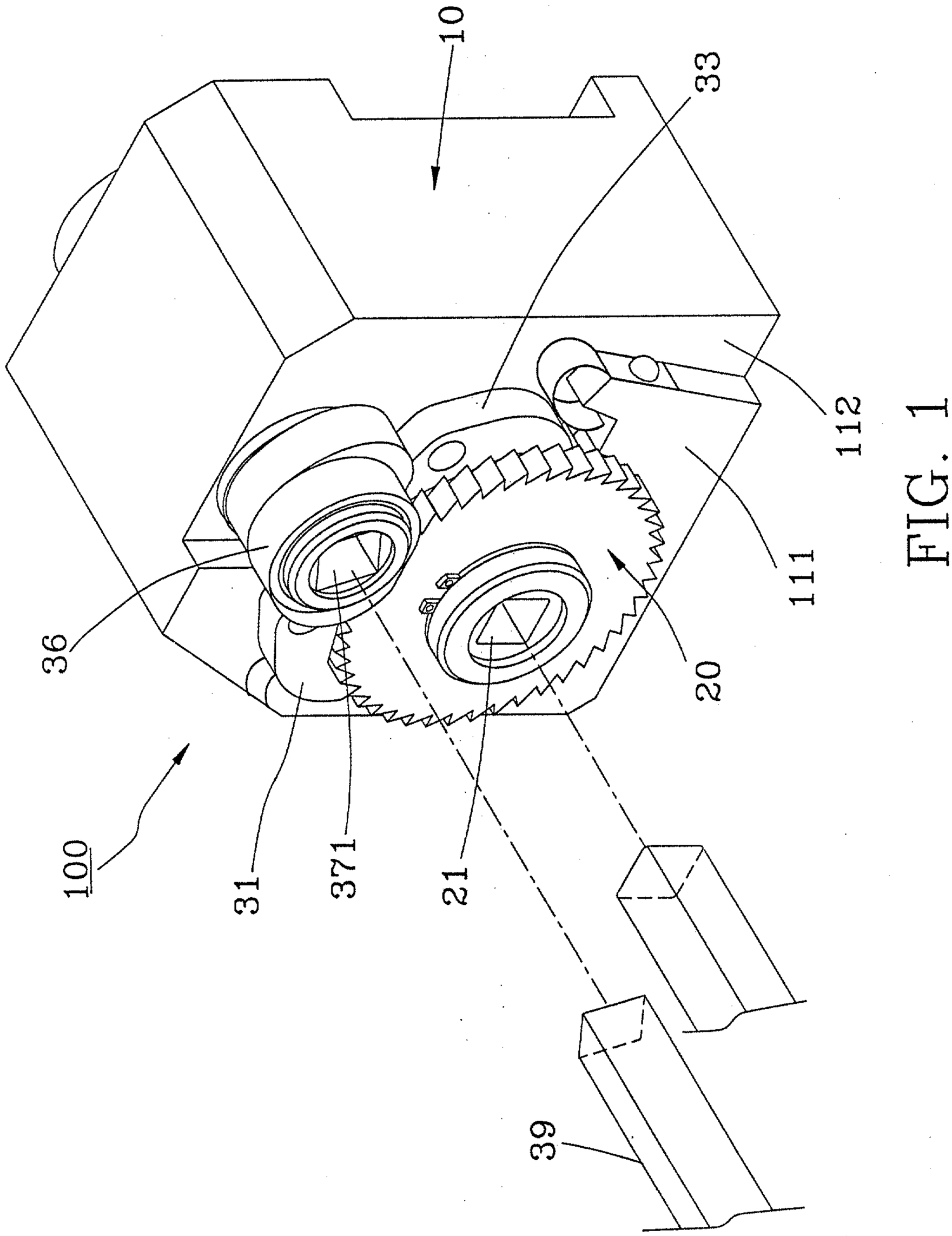


FIG. 1

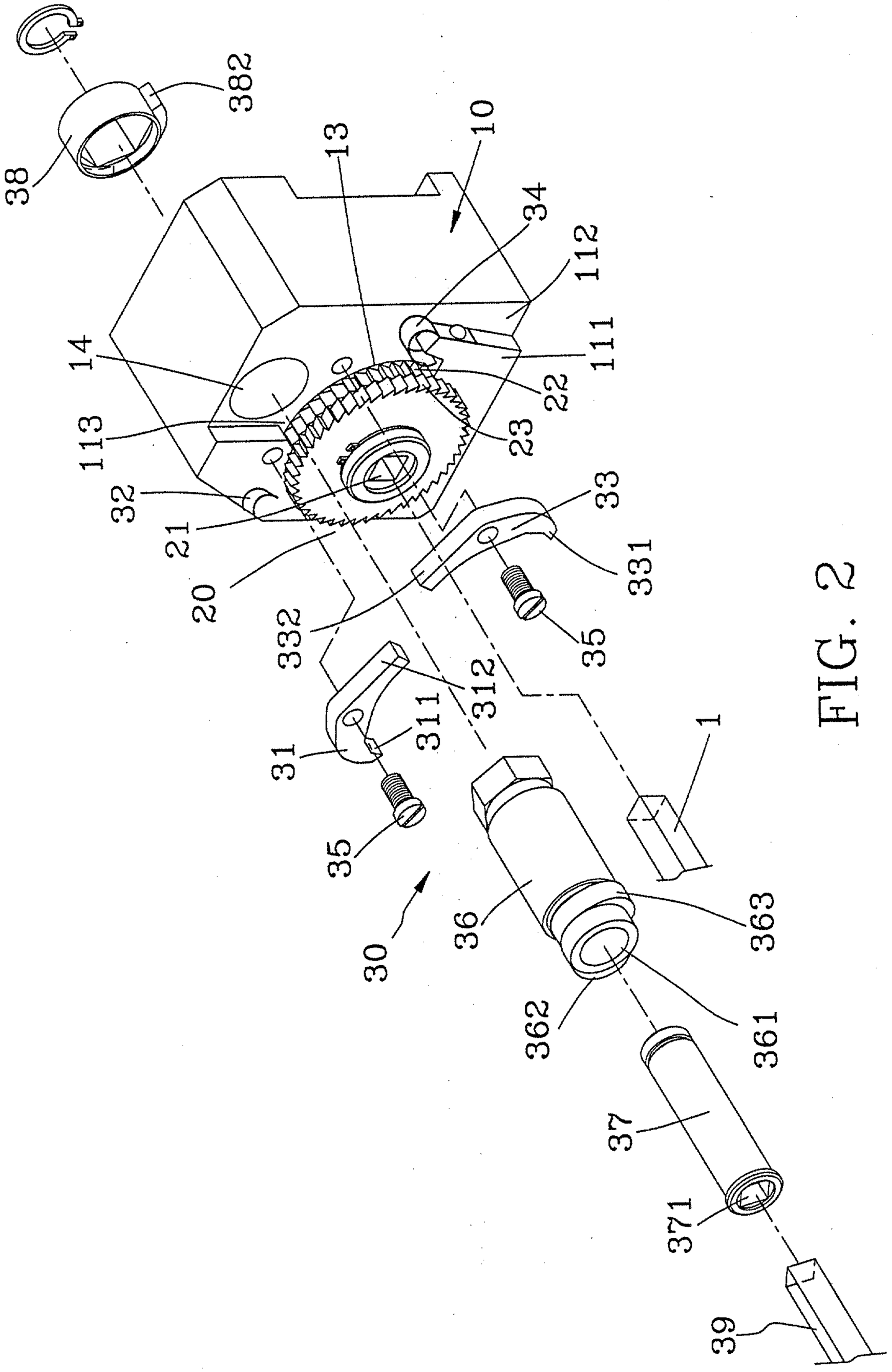

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FIG. 2

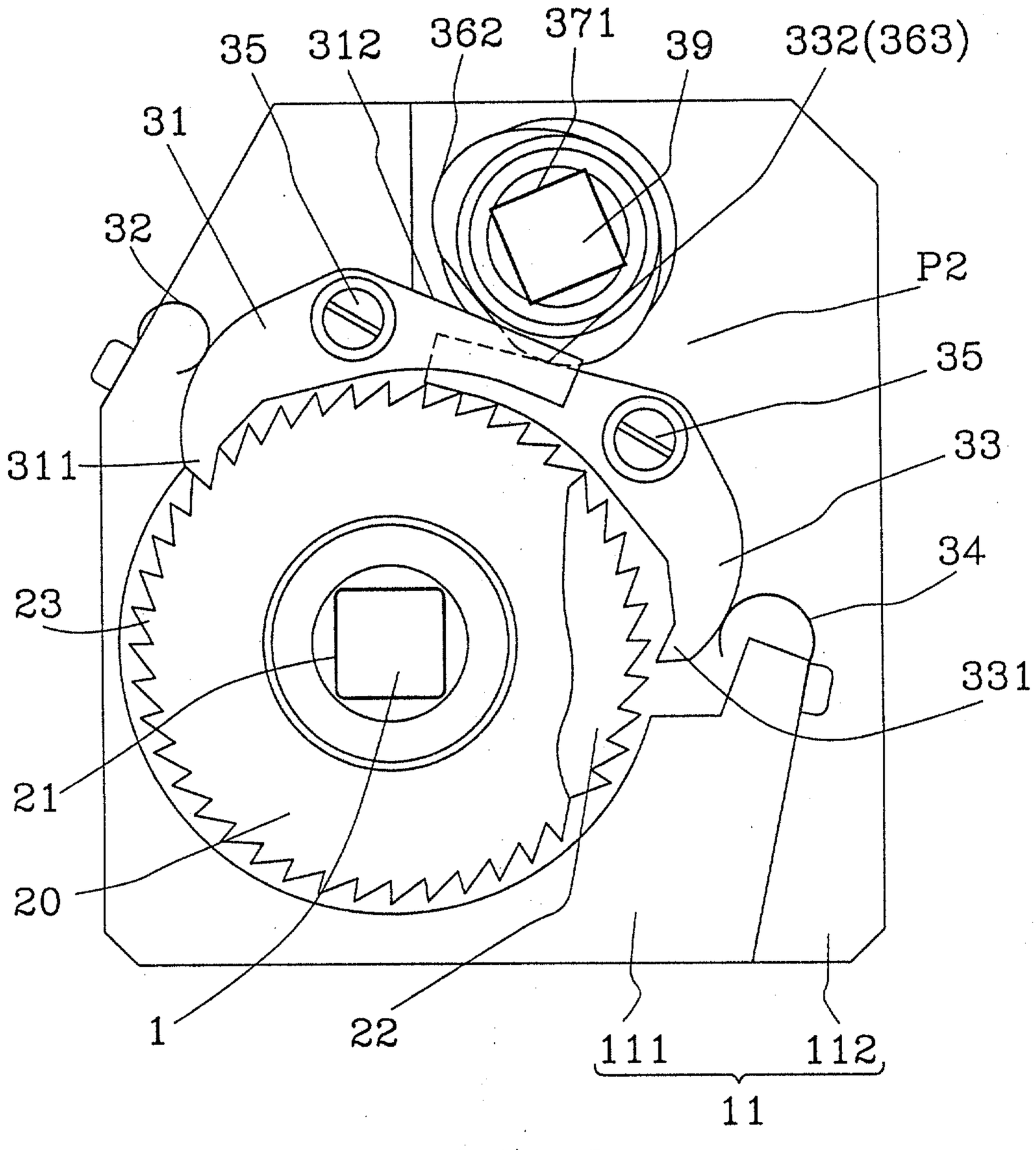
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FIG. 3

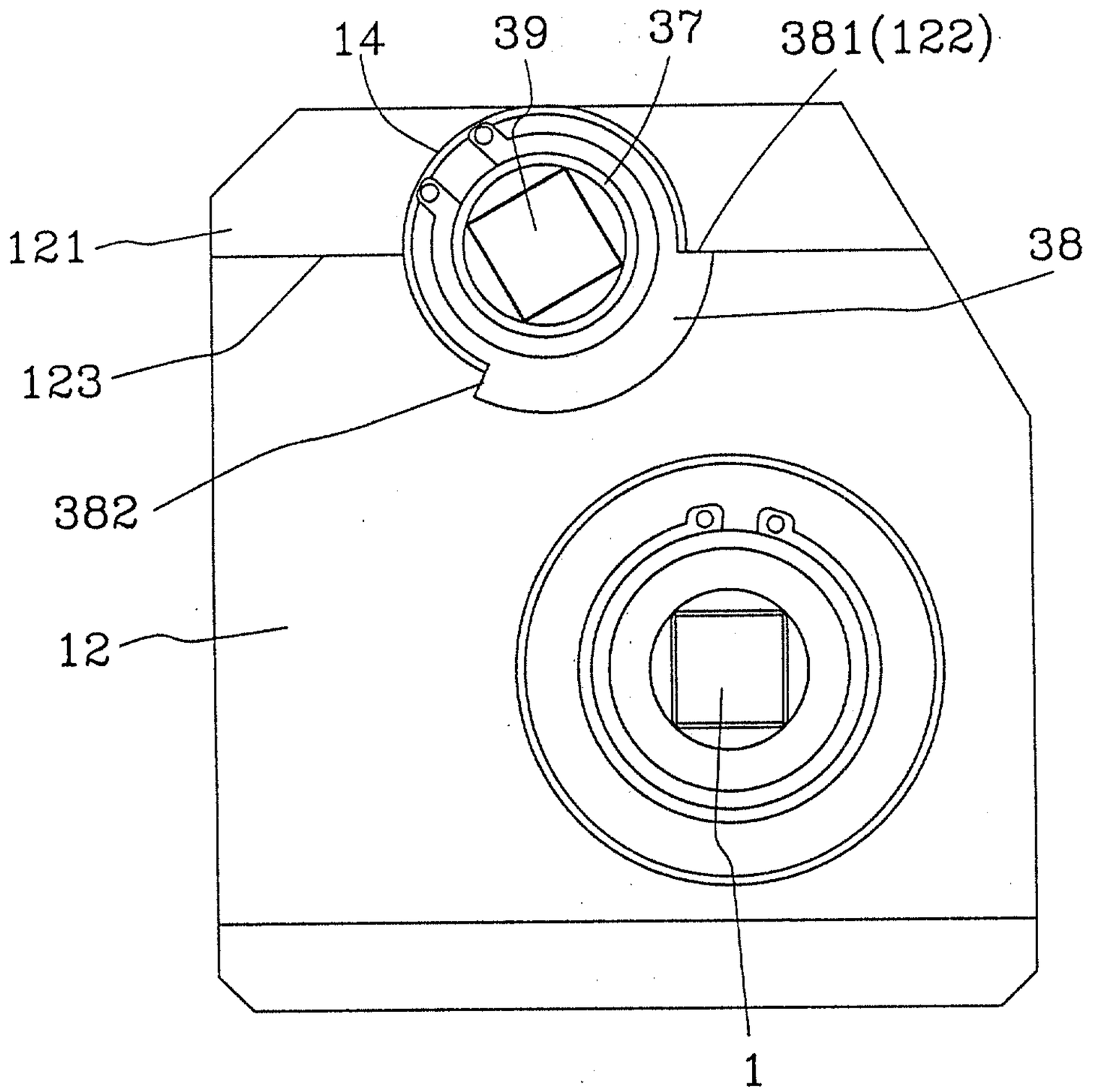


FIG. 4

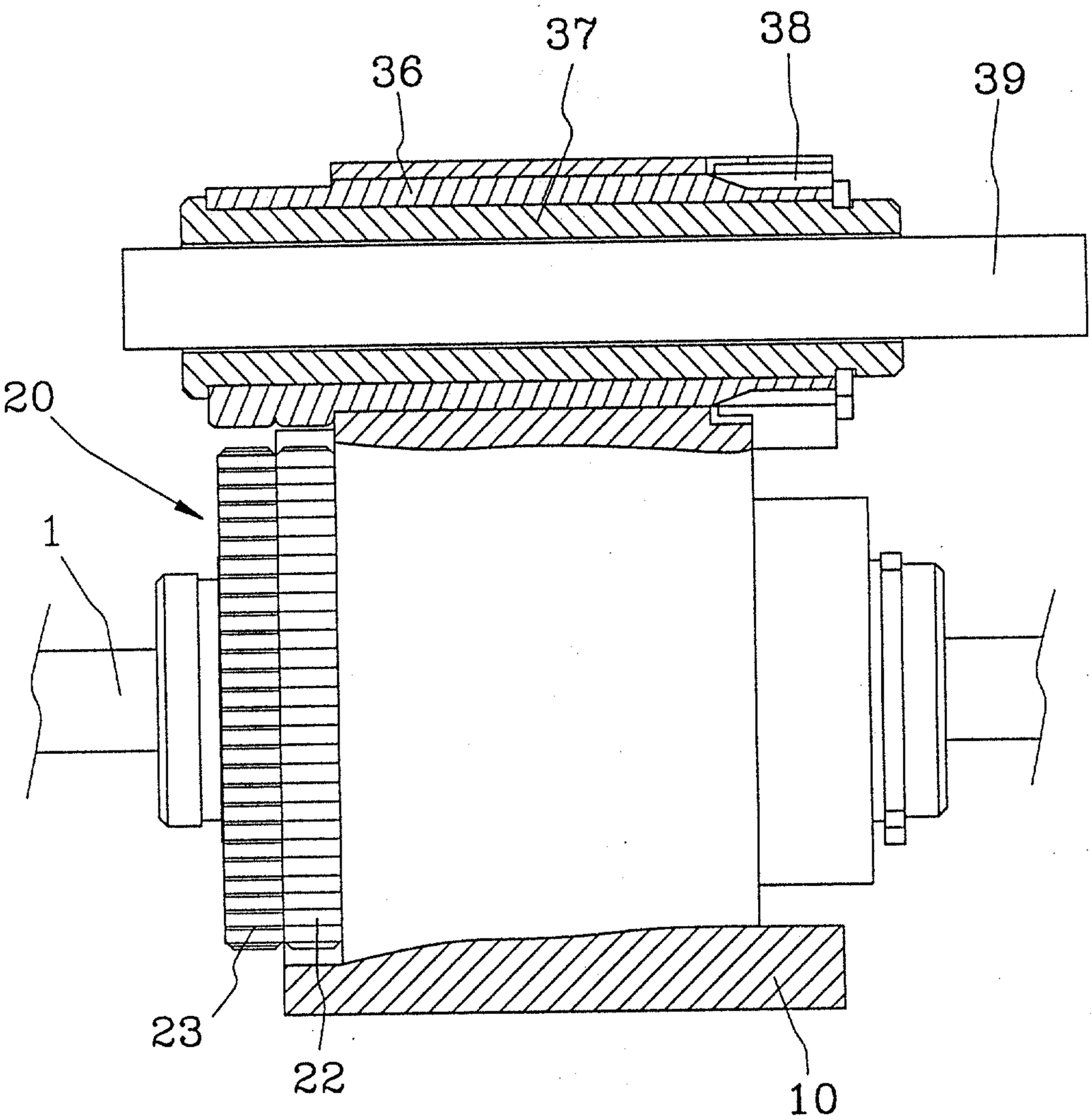


FIG. 5

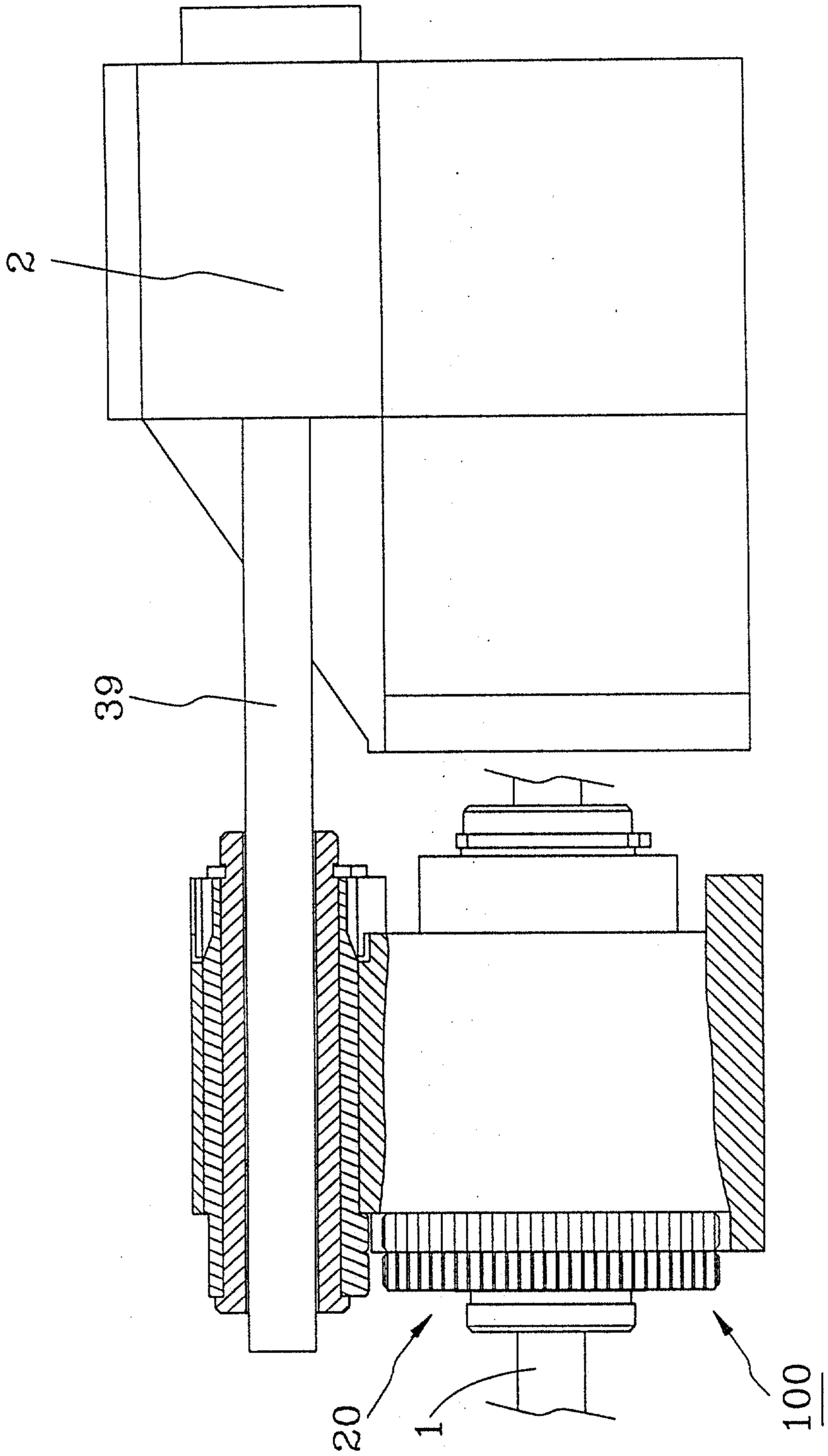


FIG. 6

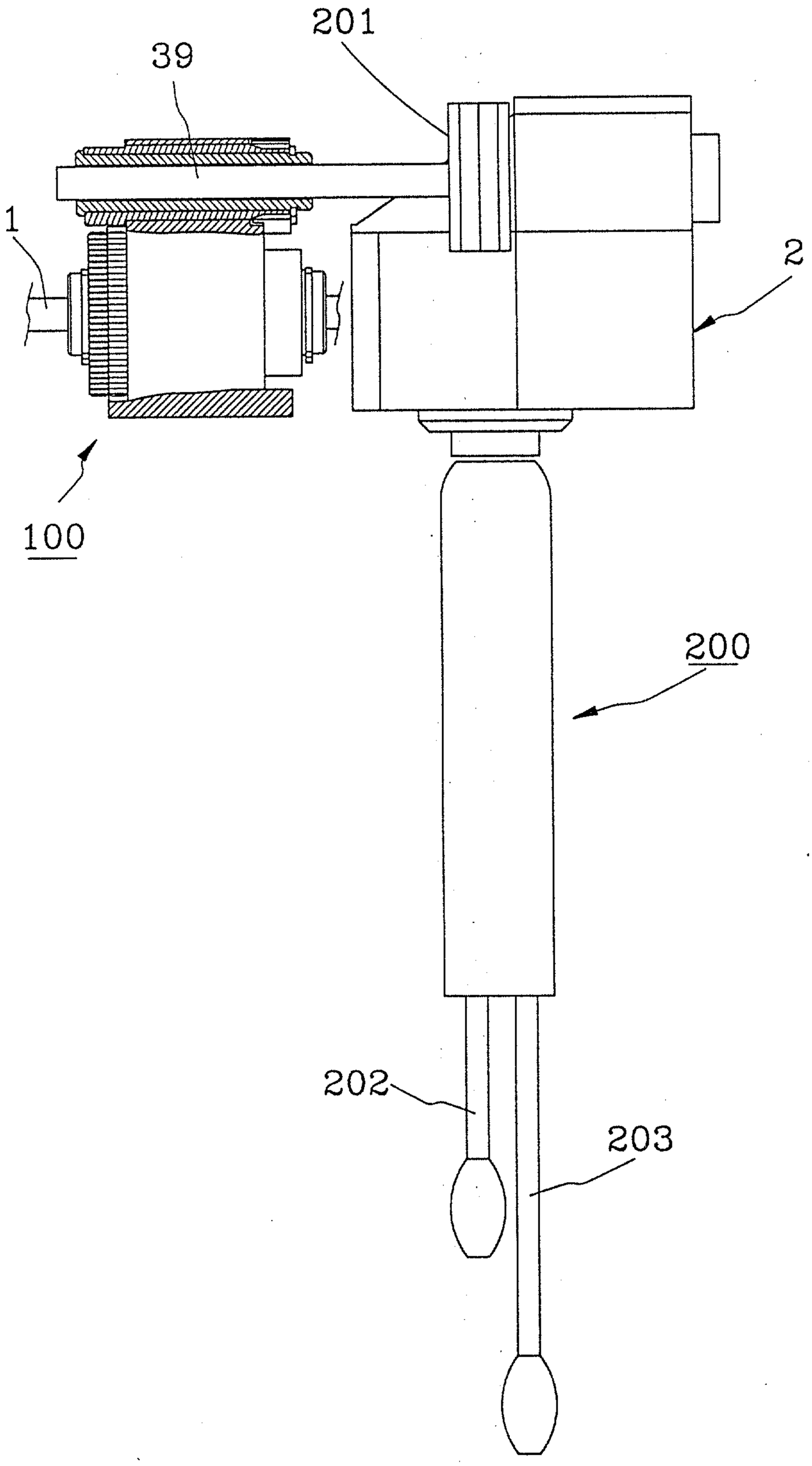


FIG. 7

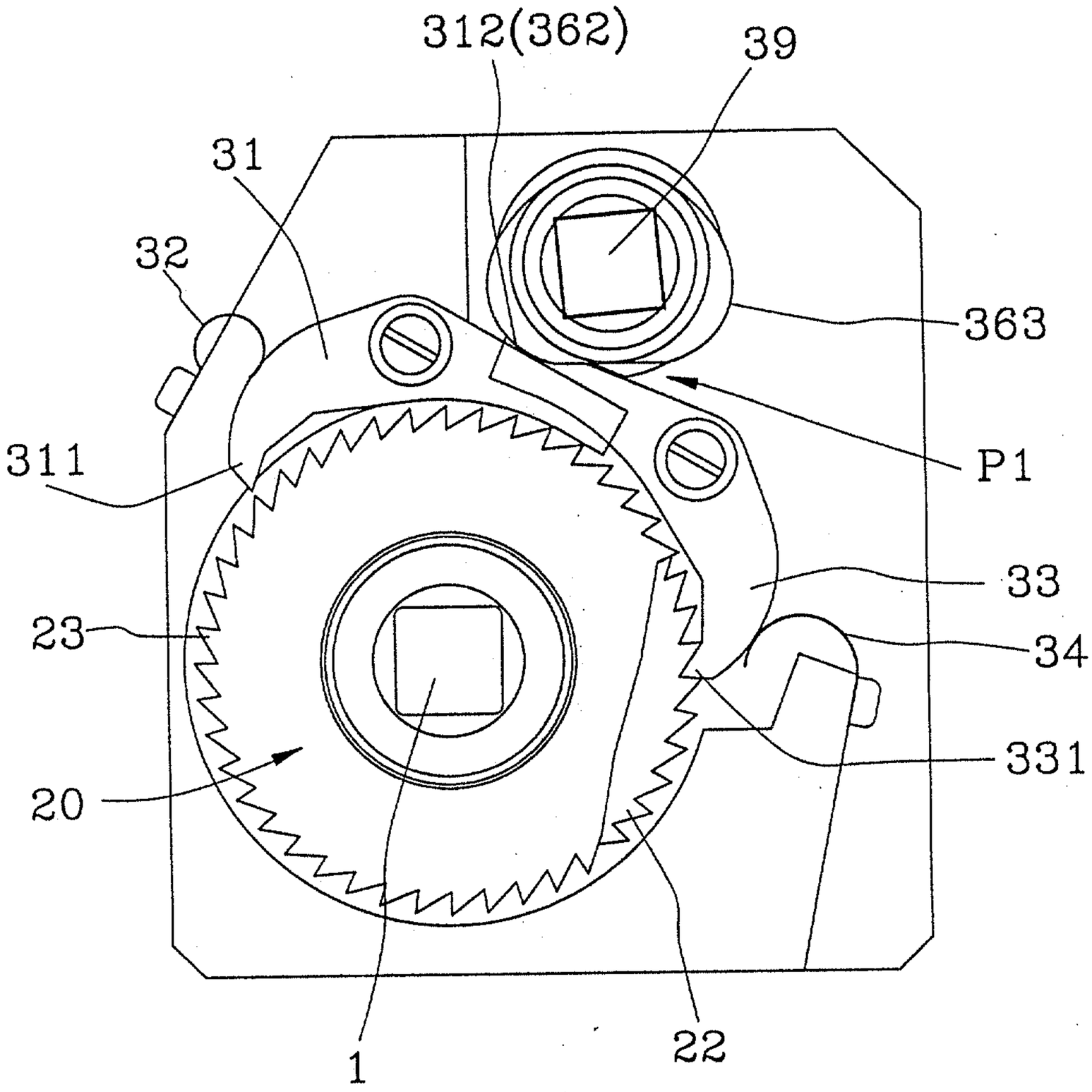


FIG. 8

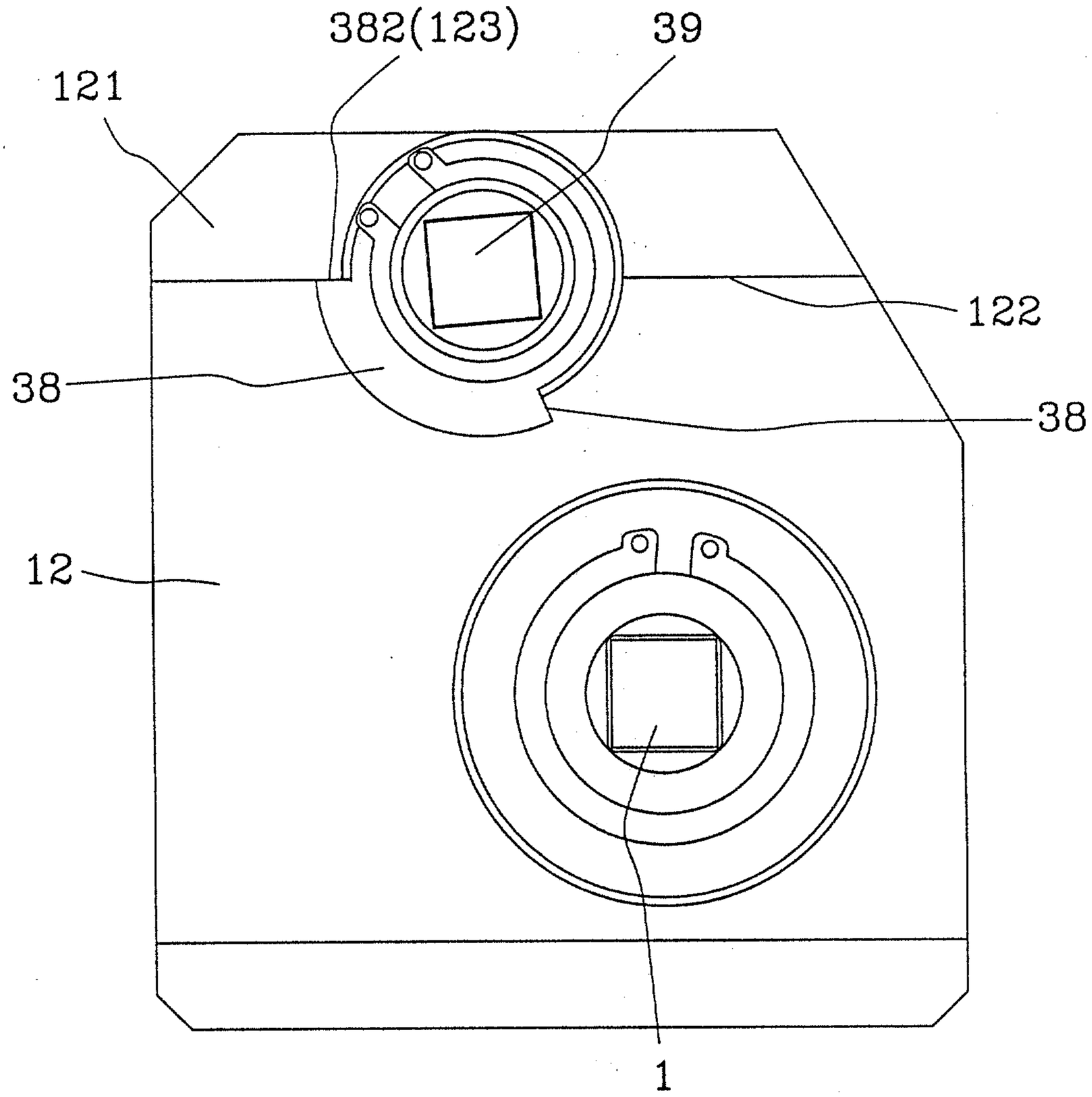
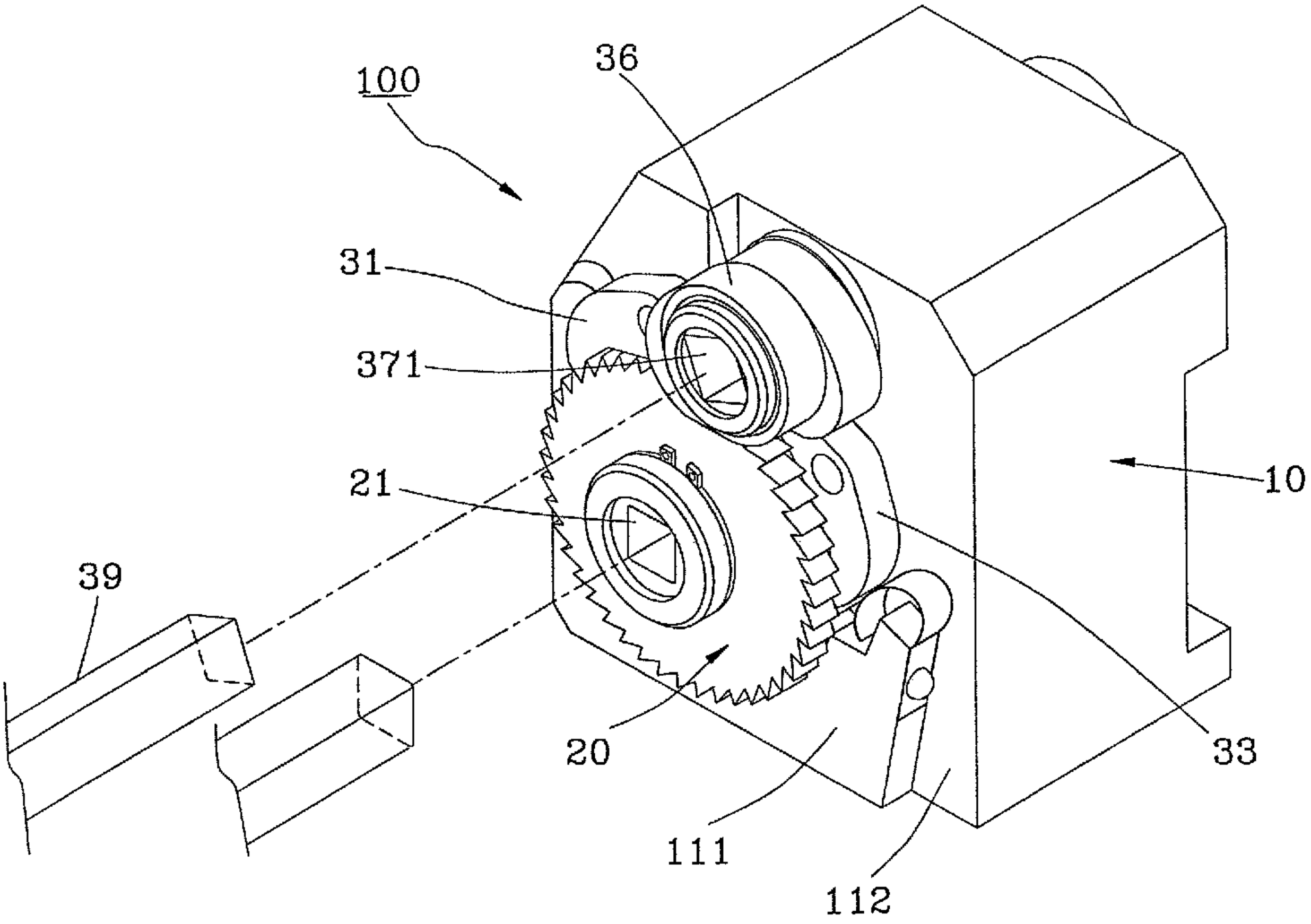


FIG. 9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