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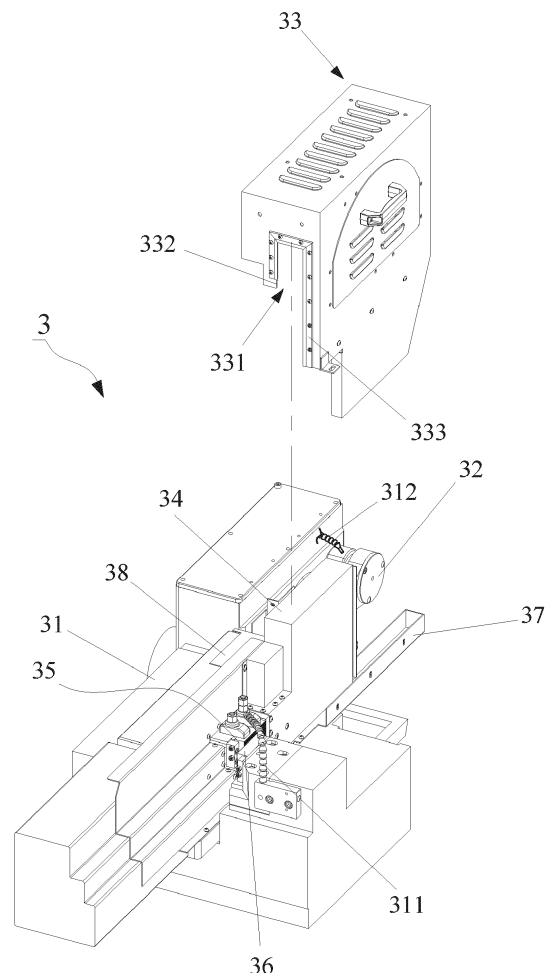
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(54) A THREAD-ROLLING MACHINE WITH A COLLECTING UNIT

(57) A thread-rolling machine (3) includes a base (31), a covering unit (33), a triggering unit (32) covered by the covering unit (33), a linking unit (34) connected to the triggering unit (32), a stationary rolling die (36), and a movable rolling die (35) linked with the triggering unit (32). The covering unit (33) defines an accommodation space (331) for covering the triggering unit (32) and a port (332) adapted to bearing a reciprocating motion of the linking unit (34). A scraping unit (333) is disposed on a periphery of the port (332). A collecting unit (37) is disposed under the linking unit (34). The collecting unit (37) is situated in the accommodation space (331) and extended beyond the covering unit (33). Accordingly, cutting fluid splattering onto the linking unit (34) is scraped off by the scraping unit (333) and is further discharged into the collecting unit (37) for being collected, thereby keeping the base (31) clean and preventing the cutting fluid from mixing with lubricating fluid applied to the triggering unit (32).

**FIG. 2****EP 4 534 219 A1**

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention relates to a thread-rolling machine and relates particularly to a thread-rolling machine having a collecting unit.

2. Description of the Related Art

[0002] Referring to Fig. 1, a conventional thread-rolling machine 1 includes a base 11, a driving member 12 disposed on the base 11, a covering member 13 covering the driving member 12, a linking member 14 connected to the driving member 12, a movable rolling die 15 linked with the driving member 12, and a stationary rolling die 16 disposed on the base 11 and opposite the movable rolling die 15. The covering member 13 defines an entrance 132 and an accommodation space 131 penetrating through the entrance 132. The driving member 12 is accommodated in the accommodation space 131. The linking member 14 is inserted from the entrance 132 into the accommodation space 131 and is operated in a reciprocating motion, that is, a repetitive back-and-forth linear movement. When the thread-rolling machine 1 starts a thread rolling operation, the linking member 14 is actuated by the driving member 12 and moves at a high speed. The high-speed movement causes the movable rolling die 15 to have a quick movement with respect to the stationary rolling die 16, thereby forming threads on screw blanks (not shown). In general, lubricating oil is applied to the driving member 12 for operating the driving member 12 without difficulties, and cutting liquid is injected to a space between the movable rolling die 15 and the stationary rolling die 16 to decrease the temperature incurred by the high-speed thread rolling operation, thereby attaining a cooling effect.

[0003] However, a large amount of cutting liquid may be randomly flung outwards during the thread rolling operation, so the flung cutting liquid splatters all over the linking member 14 easily. In this case, it is inevitable that the cutting liquid enters the covering member 13 because of the reciprocating motion of the linking member 14, and the splattering behavior of the cutting liquid pollutes the base 11 and the covering member 13. These phenomena not only cause the base 11 to become filthy but also cause the cutting liquid to mix with the lubricating fluid which is injected to the driving member 12. The decay of the lubricating fluid may be incurred when the mixing situation occurs, with the result that the decaying lubricating fluid cannot be recycled and reused. Furthermore, iron chips caused by the thread rolling operation are usually mixed with the cutting liquid which enters the accommodation space 131. The invasion of iron chips between the driving member 12 and the linking member 14 may cause the driving member 12 and the linking

member 14 to be easily broken. Thus, improvements are needed.

SUMMARY OF THE INVENTION

[0004] An object of this invention is to provide a thread-rolling machine capable of scraping off cutting fluid on a linking unit and collecting the scraped cutting fluid, thereby preventing the cutting fluid from mixing with lubricating fluid and attaining a long-lasting use of the lubricating fluid.

[0005] A thread-rolling machine with a collecting unit of this invention is as defined in claim 1. The thread-rolling machine includes a base, a fluid-feeding unit, a covering unit, a triggering unit disposed on the base and covered by the covering unit, a linking unit connected to the triggering unit, a movable rolling die linked with the triggering unit, and a stationary rolling die disposed on the base and opposite the movable rolling die. The fluid-feeding unit includes a first feeder adapted to supply cutting fluid and a second feeder adapted to supply lubricating fluid. The covering unit defines a port and an accommodation space penetrating through the port. The triggering unit is accommodated in the accommodation space, and the linking unit is inserted from the port into the accommodation space. A scraping unit is disposed on a periphery of the port. Below the linking unit is disposed a collecting unit which is situated in the accommodation space and extended beyond the covering unit. As to the cutting fluid splashing on the linking unit during a high-speed thread rolling operation, the cutting fluid splattering all over the linking unit is incessantly scraped off by the scraping unit when the linking unit is moved towards the accommodation space and moved in a direction opposite to the accommodation space repetitively, which allows the scraped cutting fluid to be forced out of the covering unit, discharged into the collecting unit, and then collected. Therefore, the cleanliness of the base can be efficiently maintained, and the occurrence of mixing the cutting fluid with the lubricating fluid which is applied to the triggering unit can be avoided, which facilitates a long-lasting use of the lubricating fluid.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

Fig. 1 is a perspective view showing a conventional thread-rolling machine;

Fig. 2 is a perspective view showing a first preferred embodiment of this invention;

Fig. 3 is a partial and enlarged view of the first preferred embodiment;

Fig. 4 is a schematic view showing an operation of the first preferred embodiment when a linking unit moves in a backward linear motion;

Fig. 5 is a schematic view showing an operation of the first preferred embodiment when a linking unit

moves in a forward linear motion;

Fig. 6 is a perspective view showing a second preferred embodiment of this invention; and

Fig. 7 is a schematic view showing an operation of the second preferred embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0007] Referring to Fig. 2 and Fig. 3, a first preferred embodiment of this invention is related to a thread-rolling machine 3. The machine 3 includes a base 31, a covering unit 33, a triggering unit 32 disposed on the base 31 and covered by the covering unit 33, a linking unit 34 connected to the triggering unit 32, a movable rolling die 35 linked with the triggering unit 32, a stationary rolling die 36 disposed on the base 31 and opposite the movable rolling die 35, and a collecting unit 37 disposed under the linking unit 34. On the base 31 is disposed a fluid-feeding unit which includes a first feeder 311 and a second feeder 312. The first feeder 311 is adapted to supply cutting fluid. The cutting fluid is injected into a space between the movable rolling die 35 and the stationary rolling die 36, thereby decreasing the temperature incurred by a thread rolling operation occurring between the dies 35, 36. In short, the use of cutting fluid fulfills a cooling function for the thread rolling operation. The second feeder 312 is adapted to supply lubricating fluid, and the lubricating fluid is injected to the triggering unit 32 to reduce friction and friction heat caused by operating the triggering unit 32. In short, the use of the lubricating fluid fulfills the lubrication required by the triggering unit 32 to assist the triggering unit 32 in working normally. The movable rolling die 35 is actuated when the linking unit 34 is driven by the triggering unit 32 so that the movable rolling die 35 moves with respect to the stationary rolling die 36 to subject screw blanks (not shown) to the thread rolling operation, thereby forming threads on each screw blank.

[0008] The covering unit 33 includes an accommodation space 331 adapted to accommodate the triggering unit 32, a port 332 defined on the covering unit 33 for bearing the movement of the linking unit 34, and a scraping unit 333 disposed on a periphery of the port 332. In other words, the accommodation space 331 penetrates through the port 332, which allows the linking unit 34 to be inserted from the port 332 into the accommodation space 331. The scraping unit 333 fits snugly with the linking unit 34 so that the scraping unit 333 is in close contact with the linking unit 34, and no space is formed therebetween. Furthermore, the collecting unit 37 is situated in the accommodation space 331 and extended beyond the covering unit 33. In other words, when the collecting unit 37 is extended, one side of the collecting unit 37 is within the accommodation space 331, and the other side thereof is out of the covering unit 33. The collecting unit 37 serves to accommodate and collect the cutting fluid which is scraped off by the scraping unit 333. In the first preferred embodiment, a blocking member 38 is, prefer-

ably, disposed between the covering unit 33 and the base 31 to fulfill an intercepting function, thereby preventing the lubricating fluid 32 applied to the triggering unit 32 from being flung outwards between the base 31 and the linking unit 34. The intercepting function of the blocking member 38 not only prevents the lubricating fluid from splattering outwards but also prevents the cutting fluid from splattering all over the accommodation space 331.

[0009] The operation is described with the aid of Fig. 2 and Fig. 3. When the thread-rolling machine 3 starts a thread rolling operation, the linking unit 34 driven by the triggering unit 32 moves repetitively at a high speed to perform a high-speed reciprocating motion, that is, a repetitive back-and-forth linear movement. Accordingly, the movable rolling die 35 is actuated to move with respect to the stationary rolling die 36 in accordance with the reciprocating motion of the linking unit 34, with the result that the thread rolling operation is executed at a high speed to form threads on screw blanks fed by a feeding apparatus (not shown). Generally, the high-speed thread rolling operation incurs high temperature between the movable rolling die 35 and the stationary rolling die 36, so the first feeder 311 is operated to inject cutting fluid to the space between the dies 35, 36. The use of the cutting fluid reduces the temperature for attaining a cooling effect. Meanwhile, iron chips caused by the thread rolling operation flow downwards when the iron chips are mixed with the cutting fluid. In this case, the cutting fluid injected from the first feeder 311 to the base 31 is flung outwardly because of the high-speed thread rolling operation, which causes the cutting fluid to splatter all over the linking unit 34. As to the reciprocating motion of the linking unit 34, the cutting fluid which splatters all over the linking unit 34 is immediately scraped off by the scraping unit 333 when the linking unit 34 enters the accommodation space 331 quickly by moving in the direction of the covering unit 33 and passing through the port 332 to present a backward linear motion, as arrowed in Fig. 4. Owing to the backward linear motion, most of the cutting fluid splattering onto the linking unit 34 can be scraped off by the scraping unit 333, and the cutting fluid can be efficiently blocked to stop the cutting fluid from entering the accommodation space 331, which prevents the cutting fluid from mixing with the lubricating fluid applied to the triggering unit 32. Therefore, the use of the lubricating fluid is not affected. The iron chips are also scraped off by the scraping unit 333 when the backward linear motion of the linking unit 34 occurs, which prevents the triggering unit 32 from getting abnormal because of the invasion of the iron chips. When the linking unit 34 withdraws from the accommodation space 331 quickly by moving in a direction opposite to the covering unit 33 and passing through the port 332 to present a forward linear motion as arrowed in Fig. 5, remaining cutting fluid still left on the linking unit 34 can be scraped off by the scraping unit 333. Consequently, the scraping unit 333 on the periphery of the port 332 fits snugly with the linking unit 34, with the result that the scraping unit 333 removes the

cutting fluid from the linking unit **34** by scraping in two directions, which leads to a bidirectional scraping effect. Accordingly, the cutting fluid flung outwards by the high-speed movement of the linking unit **34** does not mix with the lubricating fluid staying on the triggering unit **32**. In the meantime, the scraped cutting fluid, especially the cutting fluid that is scraped off by the forward linear motion, flows downwards so that the cutting fluid is efficiently discharged into the collecting unit **37** which is disposed below the linking unit **34**. Thus, the scraped cutting fluid can be collected.

[0010] Consequently, the scraping unit **333** which is arranged on the periphery of the port **332** cooperates with the collecting unit **37** which is situated under the linking unit **34**, so the scraping unit **333** subjects the cutting fluid on the linking unit **34** to a bidirectional scraping operation during the reciprocating motion of the linking unit **34**, that is, scraping in a backward linear motion firstly and then scraping in a forward linear motion. The scraping operation also intercepts the iron chips to prevent the iron chips from invading the accommodation space **331**. The scraped cutting fluid and iron chips can be discharged into the collecting unit **37** and then collected. On the whole, the above arrangement keeps the base **31** clean to maintain the cleanliness of the base **31** efficiently, and the occurrence of mixing the cutting fluid and the lubricating fluid with each other is prevented, which facilitates a long-lasting use of the lubricating fluid.

[0011] Referring to Fig. 6, a second preferred embodiment of this invention is shown. The concatenation of correlated elements and the operation of the second preferred embodiment are the same as those of the first preferred embodiment and herein are not repeated. The second preferred embodiment is characterized in that the linking unit **34** includes a first blocking unit **341** and a second blocking unit **342** respectively extending downwards in relation to the collecting unit **37**. Specifically, the first blocking unit **341** is inserted into an interior of the collecting unit **37**, and the second blocking unit **342** is situated outside the collecting unit **37**. A space is formed between the first blocking unit **341** and the second blocking unit **342** so that the blocking units **341**, **342** are spaced from each other.

[0012] Referring to Fig. 7, the scraping unit **333** is still used to scrape off the cutting fluid which splatters all over the linking unit **34** and scrape off iron chips, thereby preventing the cutting fluid and iron chips from entering the accommodation space **331** when the backward linear motion of the linking unit **34** occurs. The forward linear motion of the linking unit **34** also scrapes off the remaining cutting fluid by using the scraping unit **333**, and when the scraped cutting fluid flows downwards, the cutting fluid is discharged into the collecting unit **37** and then collected. Therefore, the base **31** is not easily polluted by the splattering cutting fluid. In addition, the scraped cutting fluid is allowed to flow along the first blocking unit **342** which is extended into the interior of the collecting unit **37**, so the cutting fluid is quickly discharged into the collecting

unit **37** and collected. A disturbing trend is that the cutting fluid may still splash outwards when the cutting fluid is quickly discharged into the collecting unit **37**. In this case, the first blocking unit **342** also serves to intercept the splashing cutting fluid to prevent the cutting fluid from invading the accommodation space **331**. In short, the scraped cutting fluid is confined in the collecting unit **37** to prevent an outward splattering problem and prevent the occurrence of mixing the cutting fluid with the lubricating fluid that is applied to the triggering unit **32**.

[0013] On the other hand, the triggering unit **32** is covered by the covering unit **33**, so the lubricating fluid does not splatter outside the covering unit **33**. In this case, the second blocking unit **342** which is situated outside the collecting unit **37** intercepts the lubricating fluid to prevent the lubricating fluid from entering the collecting unit **37**, so the lubricating fluid does not mix with the cutting fluid discharged into the collecting unit **37**. Meanwhile, the first blocking unit **341** intercepts the cutting fluid and iron chips to prevent their splattering problem. Accordingly, the cutting fluid and the lubricating fluid do not mix with each other, with the result that the decay of the lubricating fluid does not occur and that the lubricating fluid endures for a long period of time to attain a long-lasting use. In this regard, the cutting fluid and the lubricating fluid function normally to fulfill the cooling effect and the lubricating effect respectively, thereby prolonging the service life of the thread-rolling machine **3**.

[0014] To sum up, this invention takes advantages of the scraping unit arranged on the periphery of the port to scrape off the cutting fluid on the linking unit by the reciprocating motion of the linking unit, thereby preventing the cutting fluid from invading the covering unit. This invention also takes advantages of the collecting unit located below the linking unit to accommodate the scraped cutting fluid when the cutting fluid flows downwards. Therefore, the cleanliness of the base is efficiently maintained so that the base does not become filthy easily. The cooperation between the scraping unit and the collecting unit also prevents the cutting fluid and the lubricating fluid from mixing with each other, which allows both fluid to function normally and facilitates a long-lasting use of the lubricating fluid.

[0015] While the embodiments are shown and described above, it is understood that further variations and modifications may be made without departing from the scope of this invention.

Claims

1. A thread-rolling machine (3) with a collecting unit (37) comprising a base (31), a fluid-feeding unit, a covering unit (33), a triggering unit (32) disposed on said base (31) and covered by said covering unit (33), a linking unit (34) connected to said triggering unit (32), a movable rolling die (35) linked with said triggering unit (32), and a stationary rolling die (36) disposed on

said base (31) and opposite said movable rolling die (35), wherein said fluid-feeding unit includes a first feeder (311) adapted to supply cutting fluid and a second feeder (312) adapted to supply lubricating fluid, said covering unit (33) defining a port (332) and an accommodation space (331) penetrating through said port (332), said triggering unit (32) being accommodated in said accommodation space (331), said linking unit (34) being inserted from said port (332) into said accommodation space (331) to present a reciprocating motion;

characterized in that a scraping unit (333) is disposed on a periphery of said port (332), a collecting unit (37) being situated in said accommodation space (331) and extended beyond said covering unit (33), said collecting unit (37) being disposed under said linking unit (34), thereby allowing said cutting fluid left on said linking unit (34) to be discharged into said collecting unit (37) and forced out of said covering unit (33) during said reciprocating motion for preventing said cutting fluid from mixing with said lubricating fluid which is applied to said triggering unit (32).

2. The thread-rolling machine (3) according to claim 1, further comprising a blocking member (38) disposed between said covering unit (33) and said base (31).
3. The thread-rolling machine (3) according to claim 1, wherein said linking unit (34) includes a first blocking unit (341) inserted into an interior of said collecting unit (37) and a second blocking unit (342) situated outside said collecting unit (37), a space being formed between said first blocking unit (341) and said second blocking unit (342).
4. The thread-rolling machine (3) according to claim 1, wherein said linking unit (34) fits snugly with said scraping unit (333) so that said cutting fluid left on said linking unit (34) is efficiently scraped off by said scraping unit (333).

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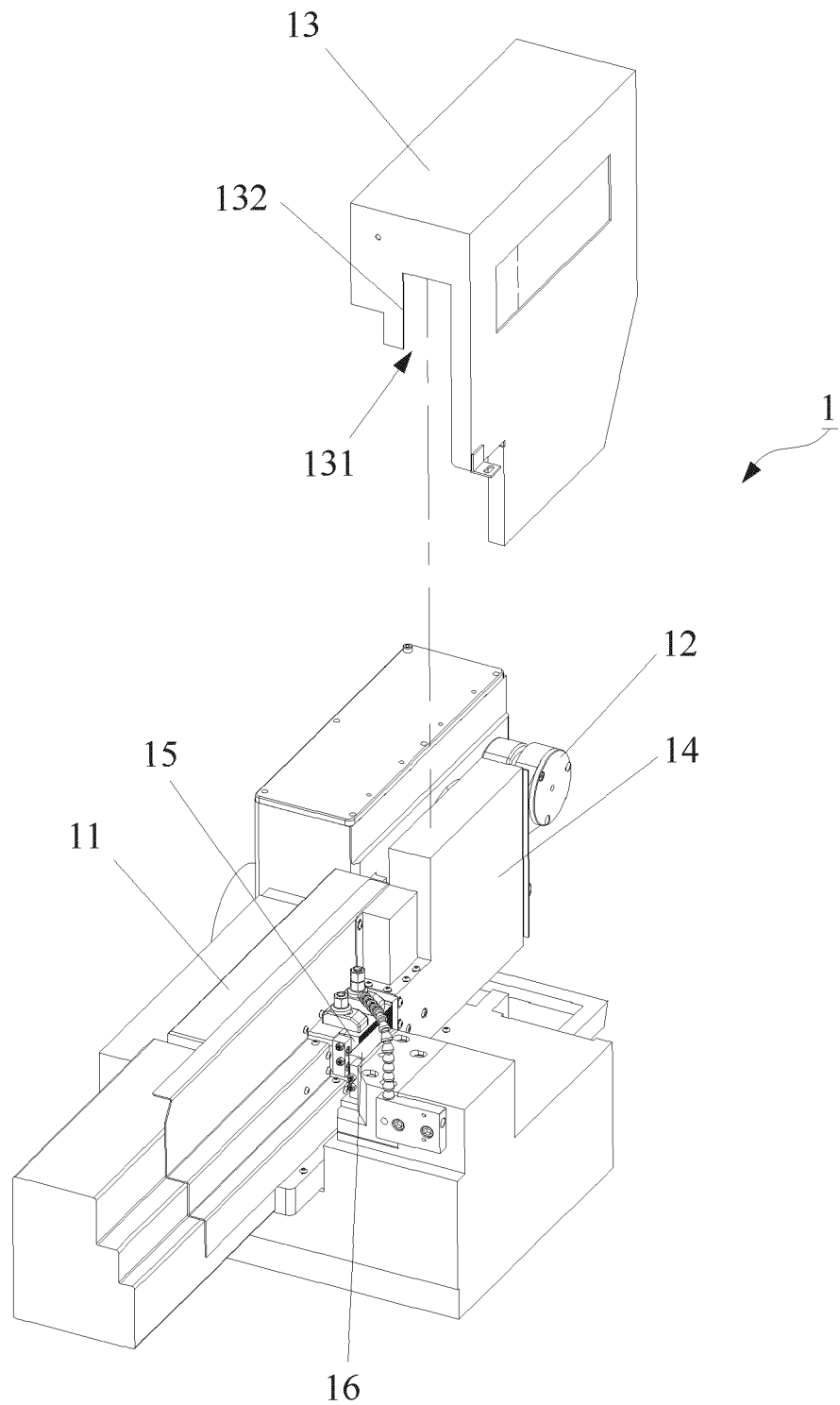


FIG. 1 (PRIOR ART)

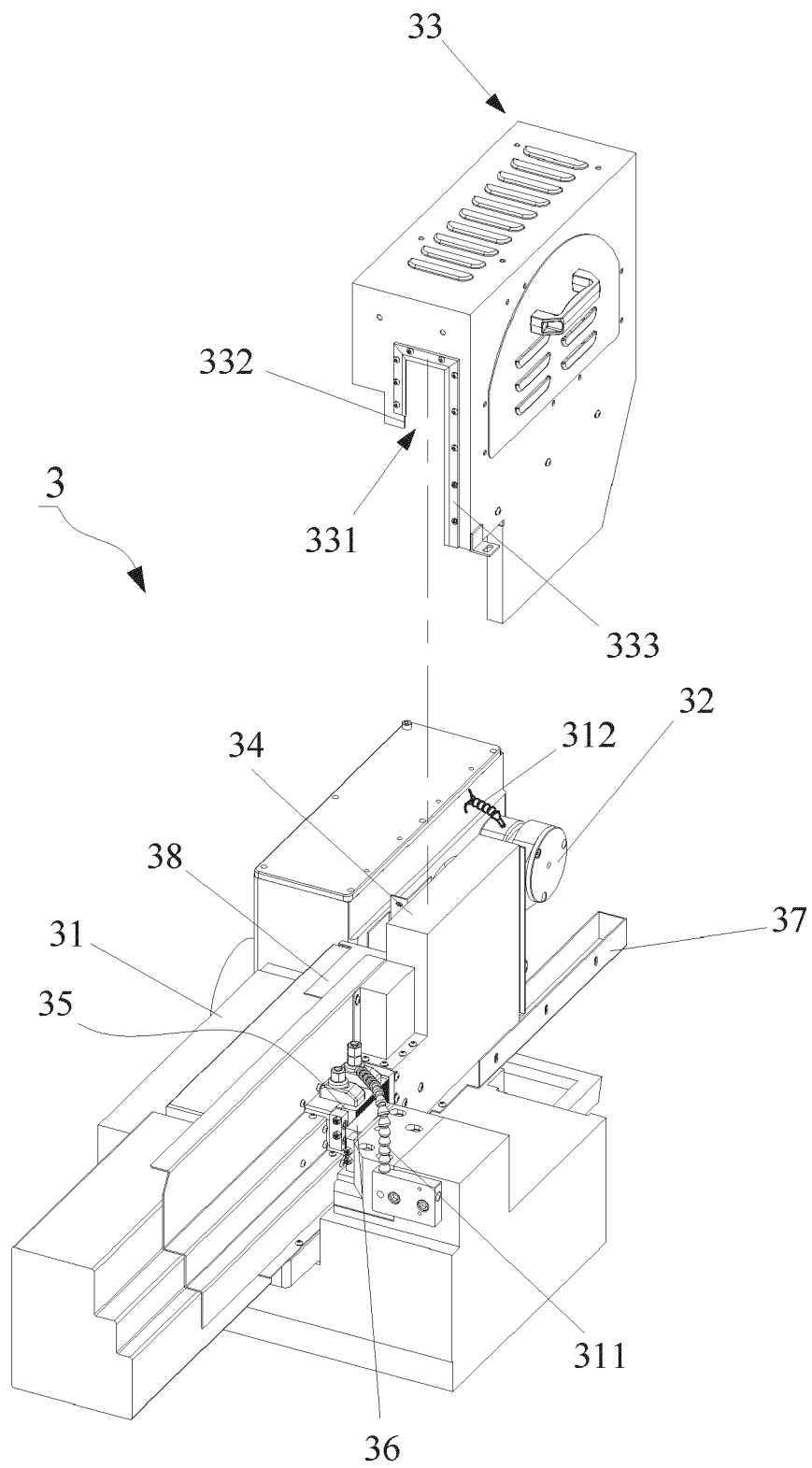


FIG. 2

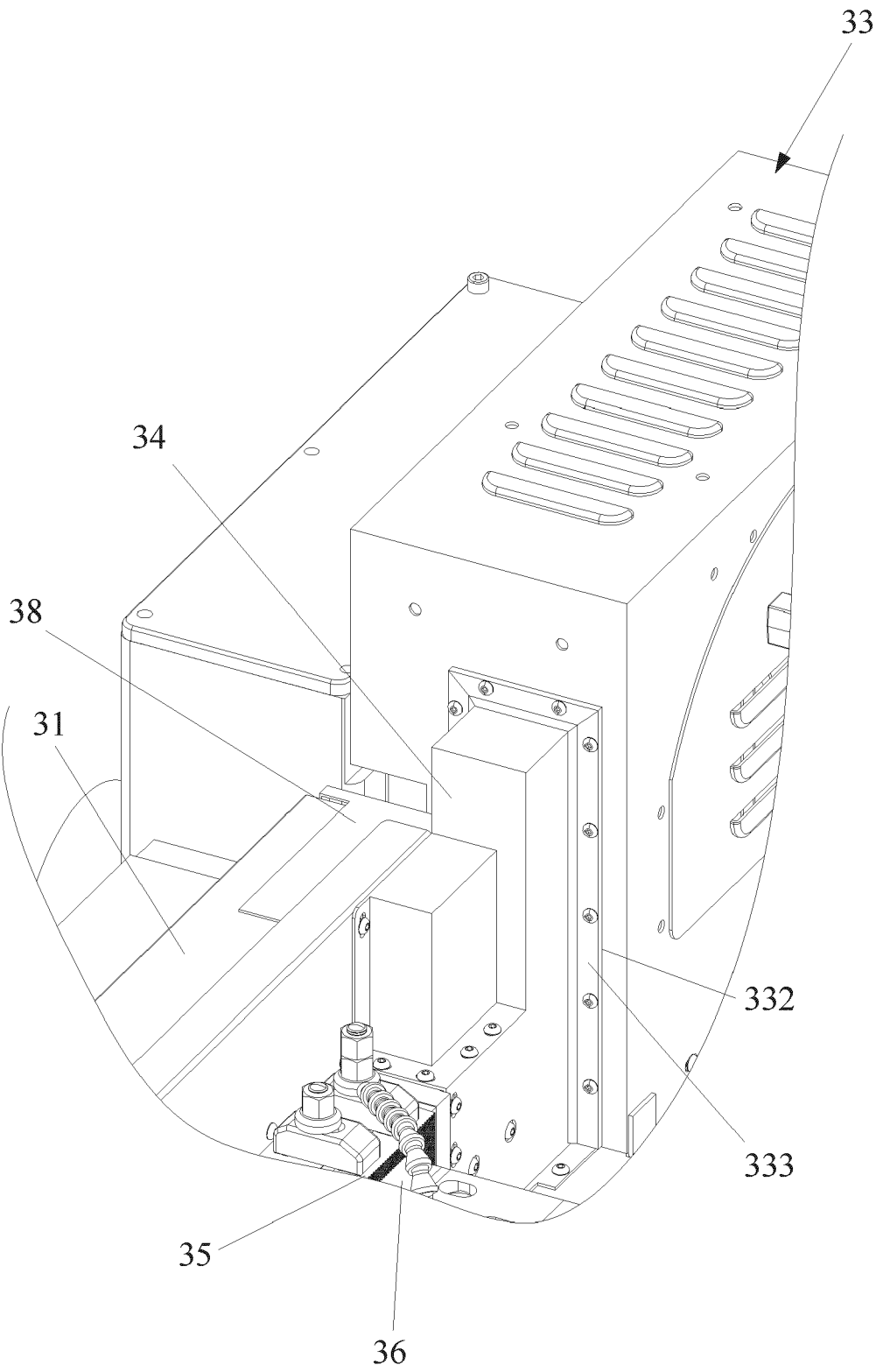


FIG. 3

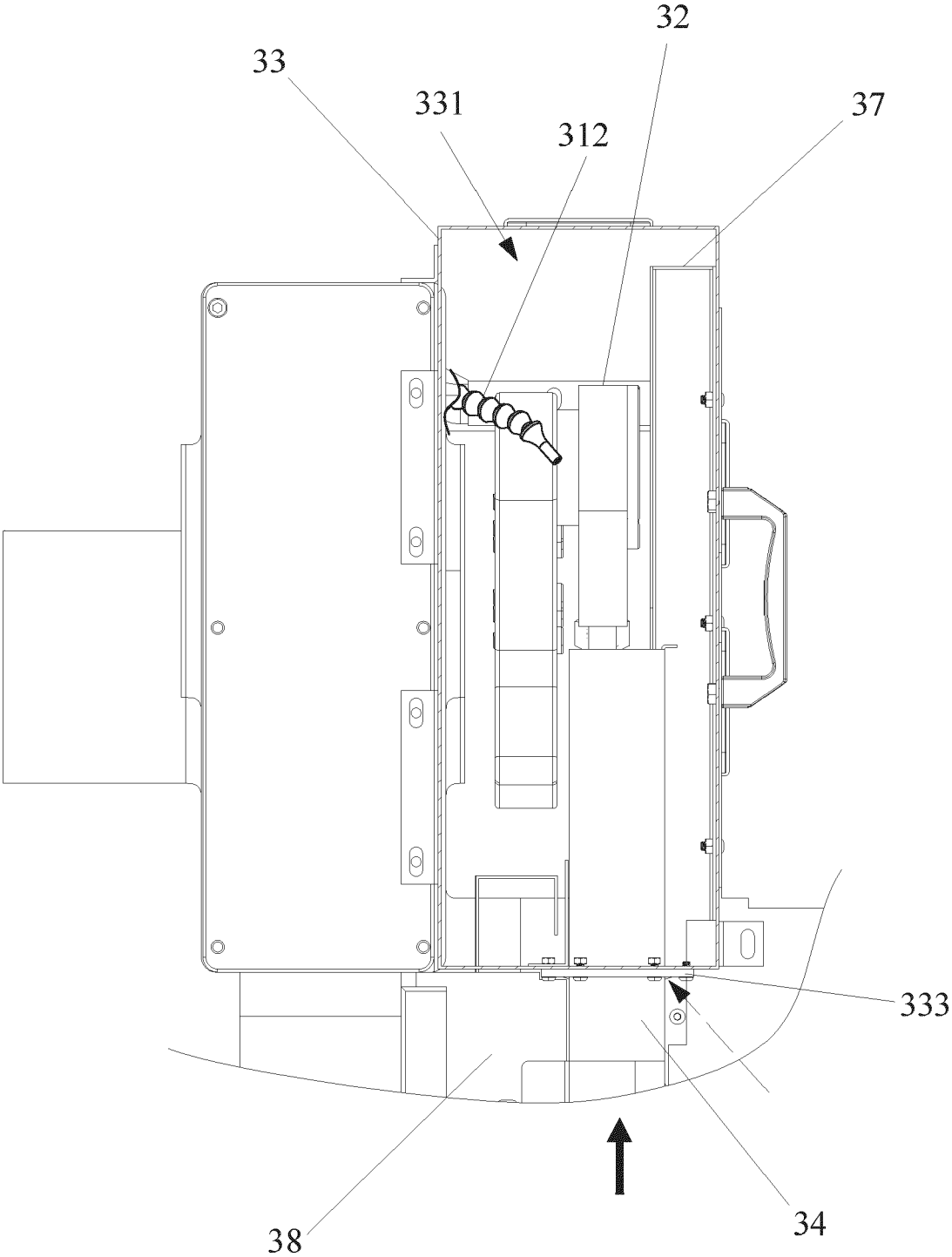


FIG. 4

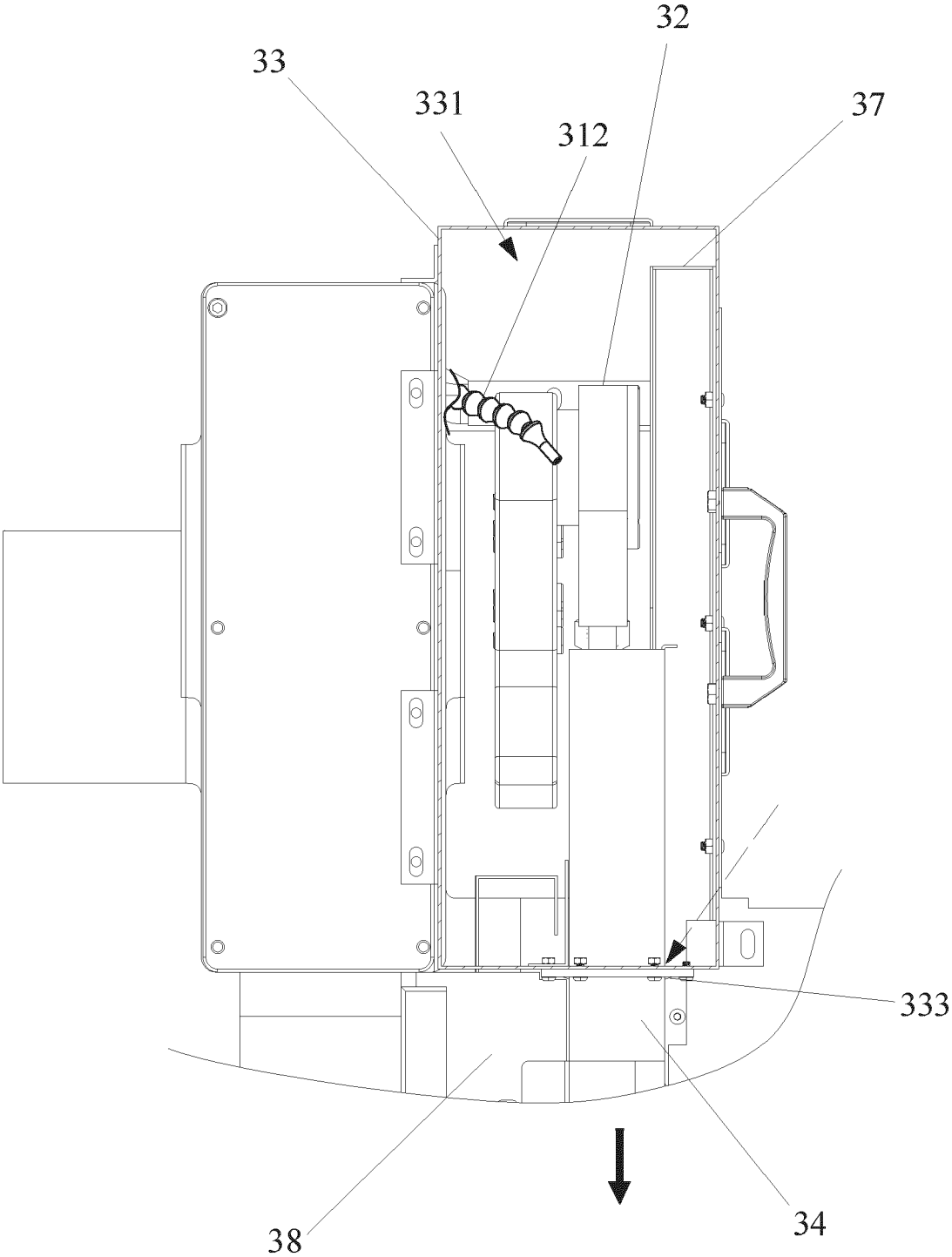


FIG. 5

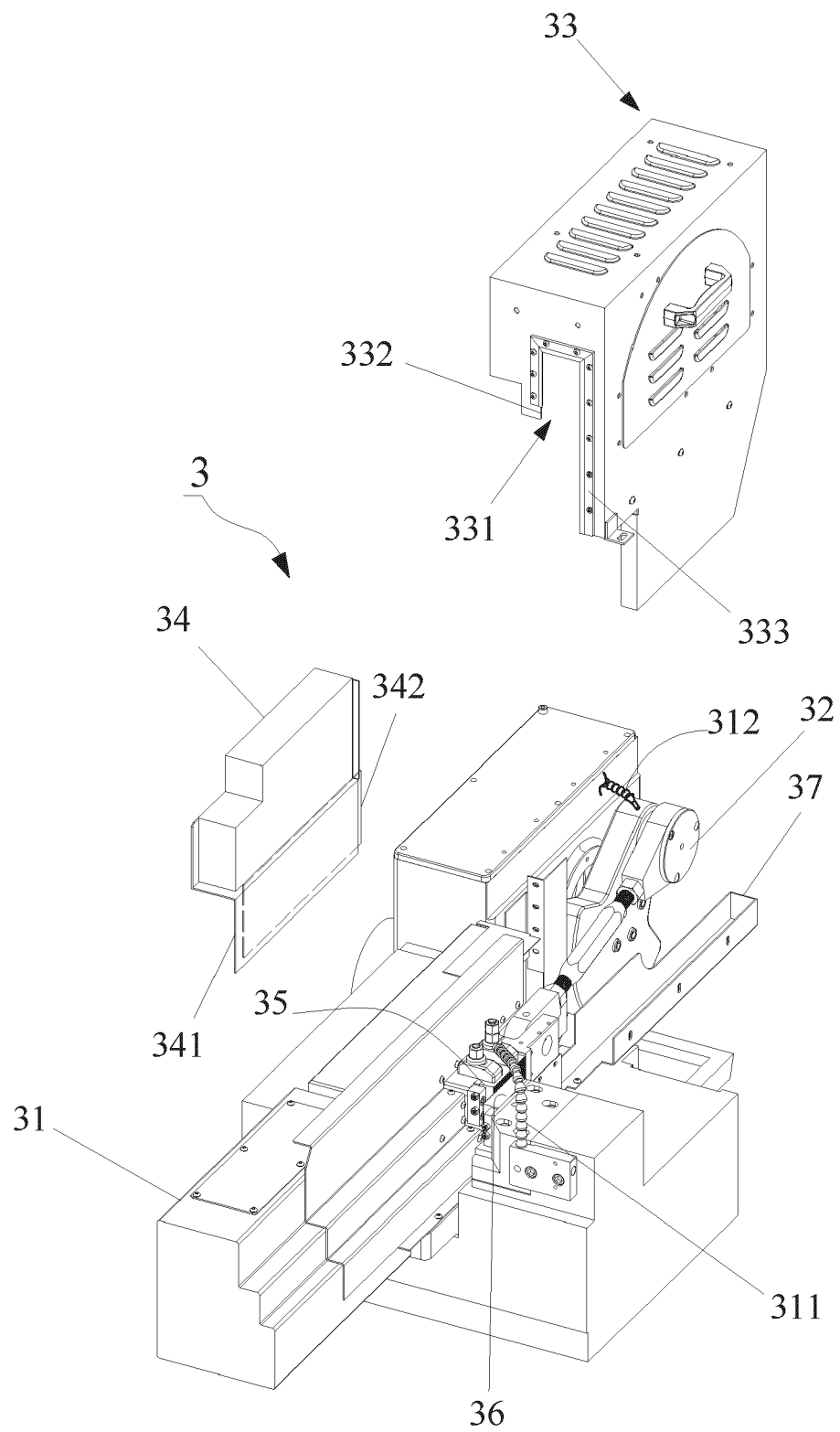


FIG. 6

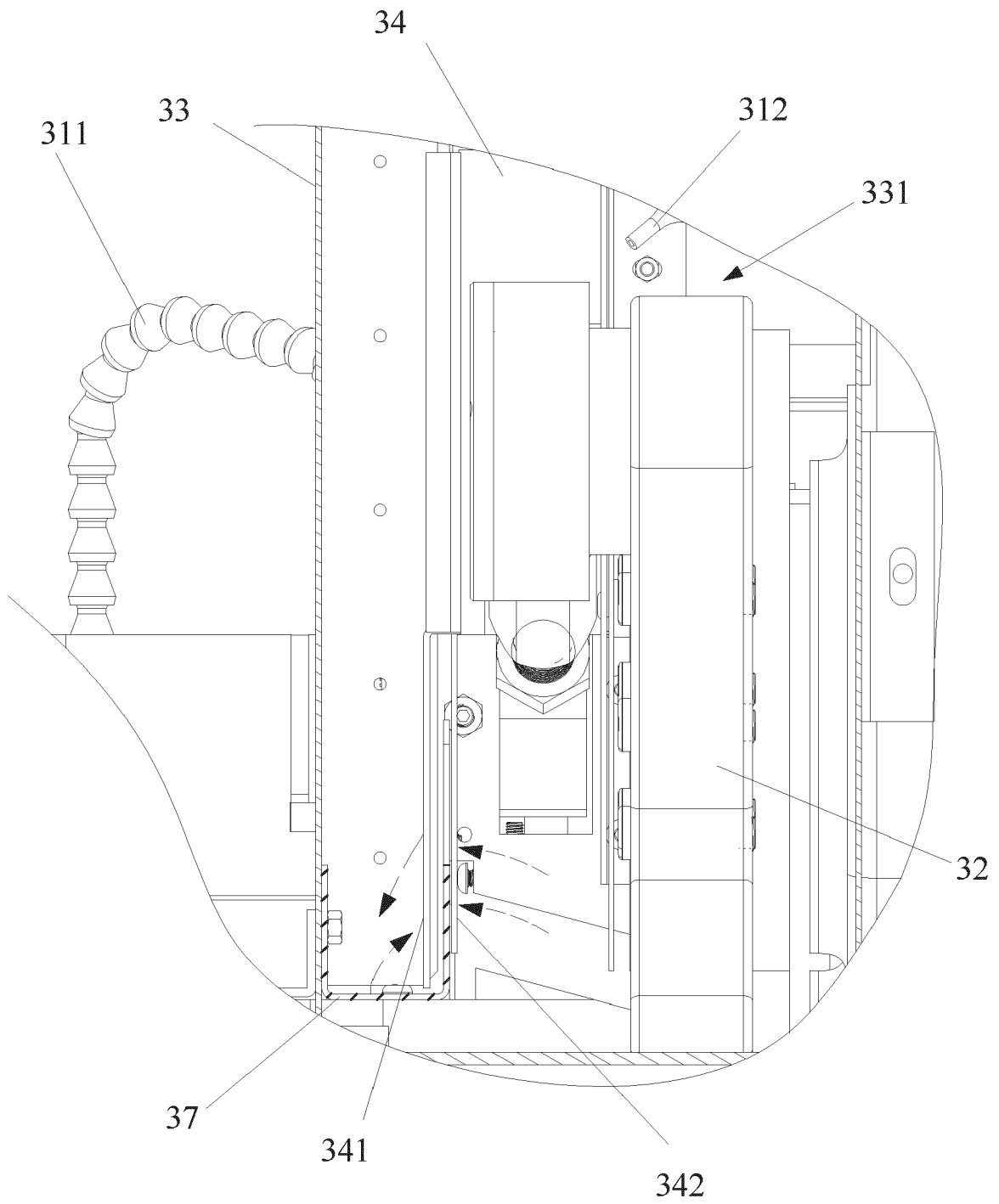


FIG. 7



EUROPEAN SEARCH REPORT

Application Number

EP 24 18 9295

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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		15 January 2025	Ritter, Florian
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