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(54) **AIR PUMP**

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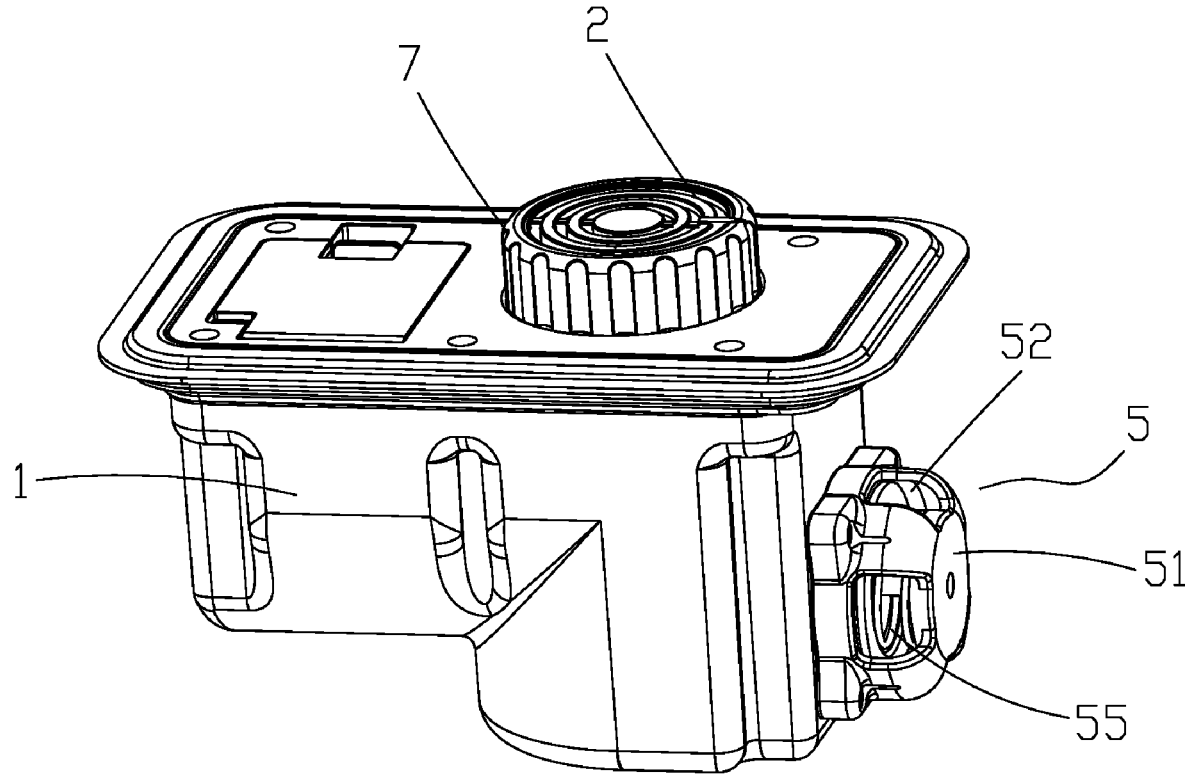
(57) **ABSTRACT**

An air pump including an air inlet and outlet provided on housing, the housing connecting sealing assembly capable of sealing air outlet, and a rotary bracket disposed inside housing, capable of driving the sealing assembly to open or seal air outlet when rotating. The sealing assembly includes a cover body connected to housing and provided with an airflow passage communicating with air outlet, the sealing assembly further includes sealing bracket capable of being pushed by rotary bracket and sliding horizontally relative to housing when the rotary bracket rotates. The sealing bracket includes sealing body with at least two contacting bars of an array in a circumferential direction contacting rotary bracket, the sealing bracket has a sealing ring capable of being in sealing contact with housing and being detached from housing when sealing bracket slides, a spring for pressing the sealing bracket toward housing is disposed between sealing and cover body.



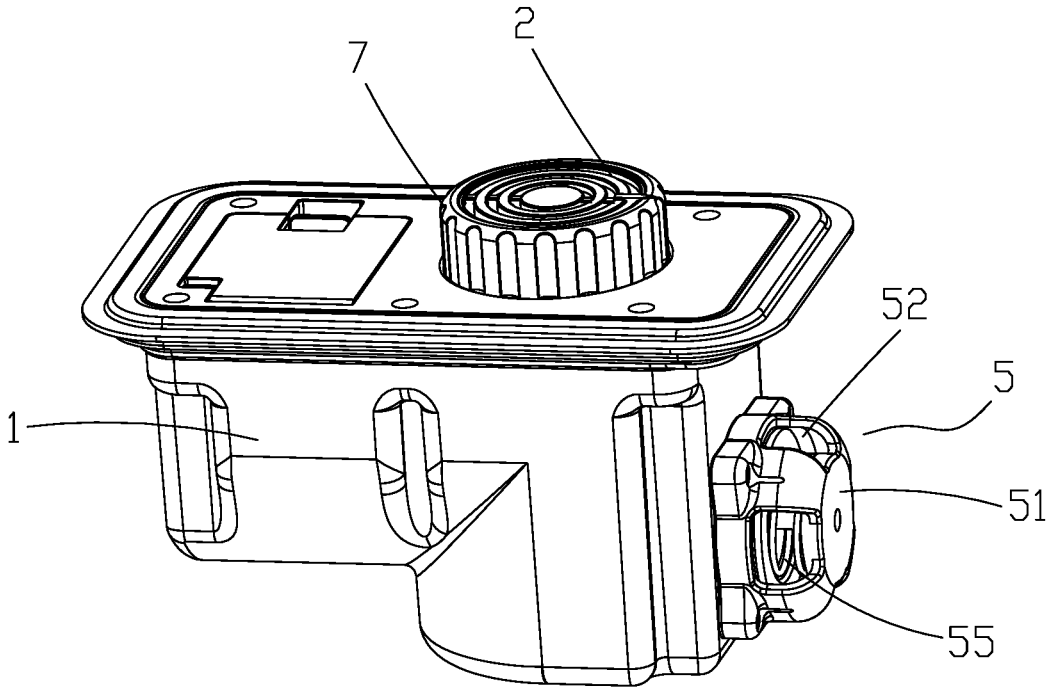


FIGURE 1

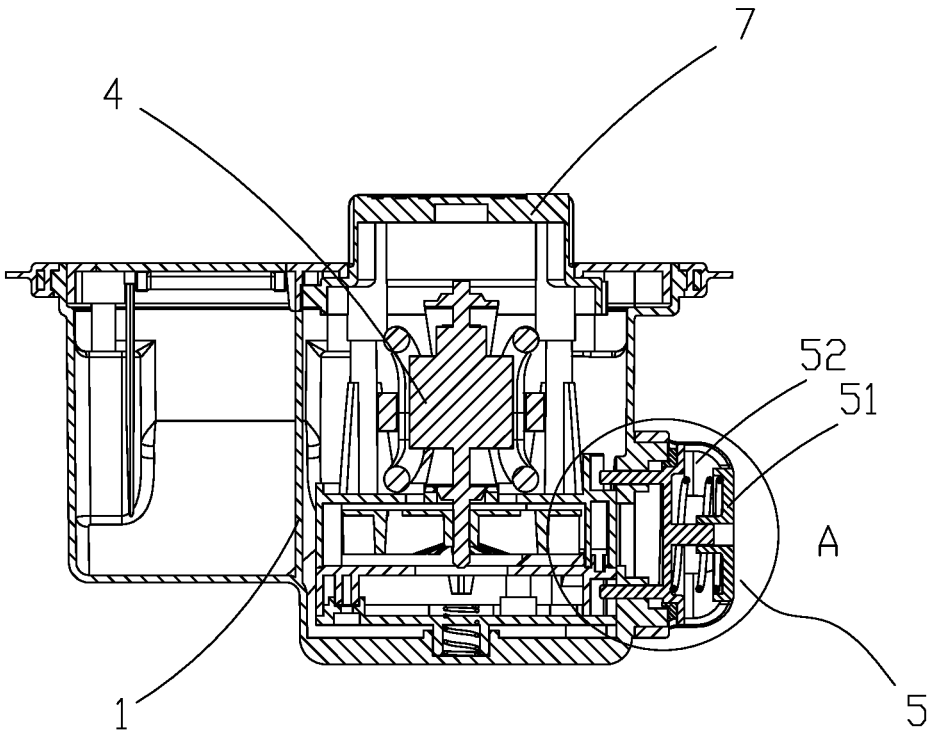


FIGURE 2

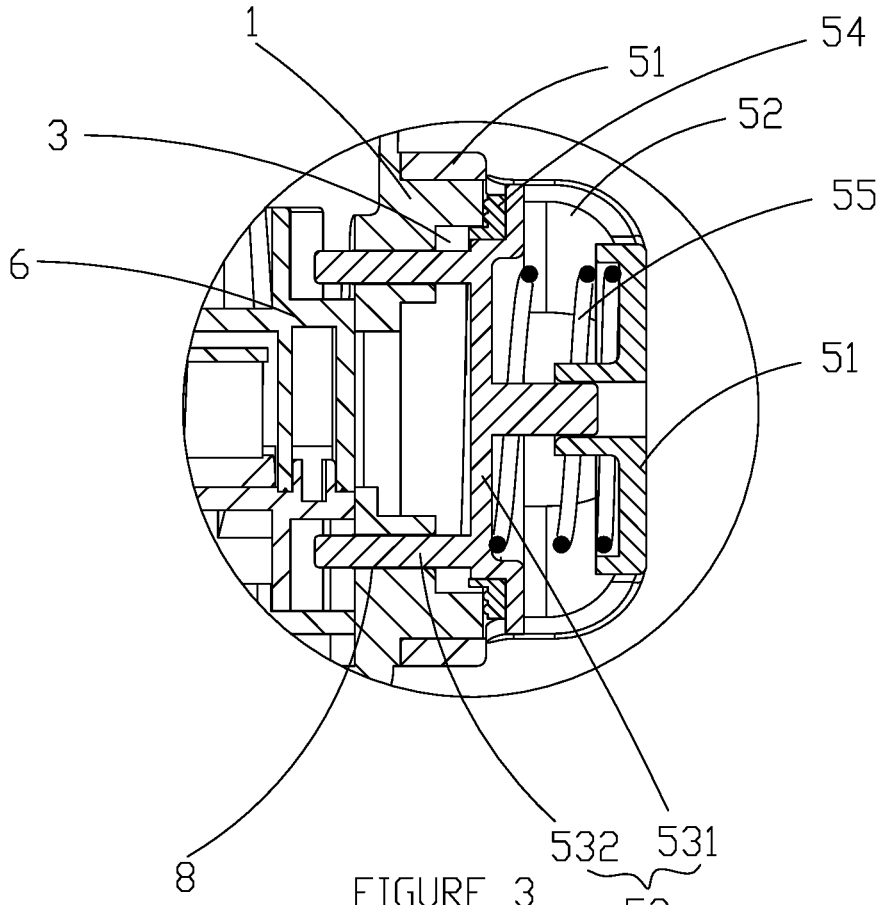


FIGURE 3

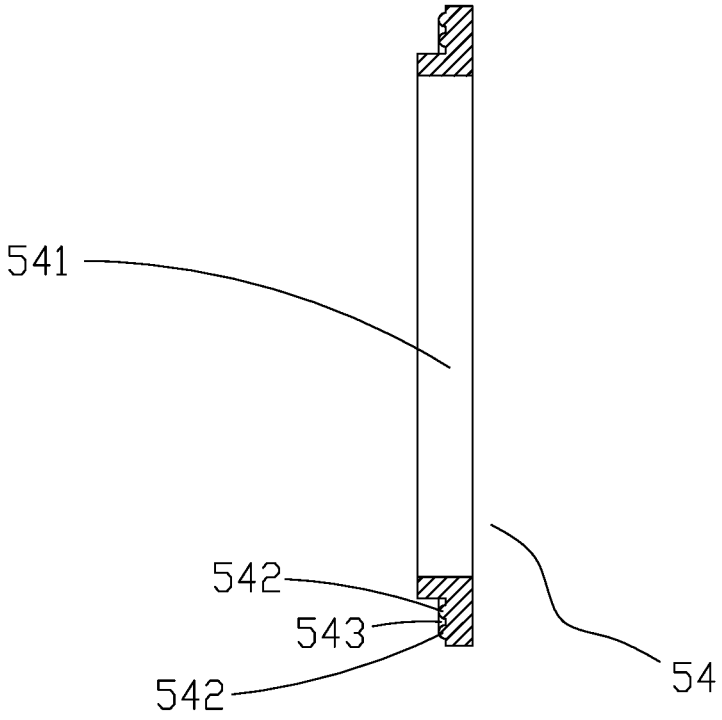


FIGURE 4

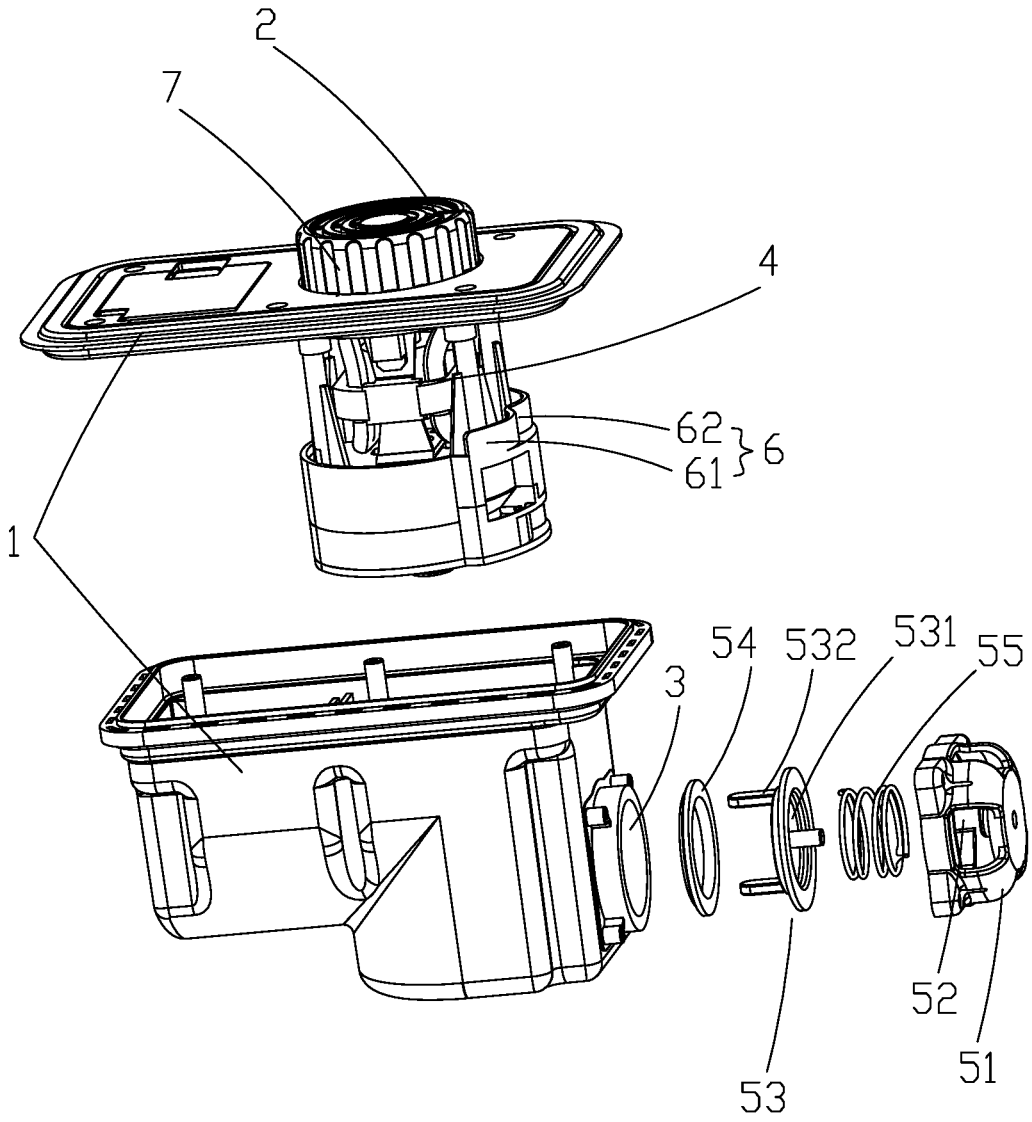


FIGURE 5

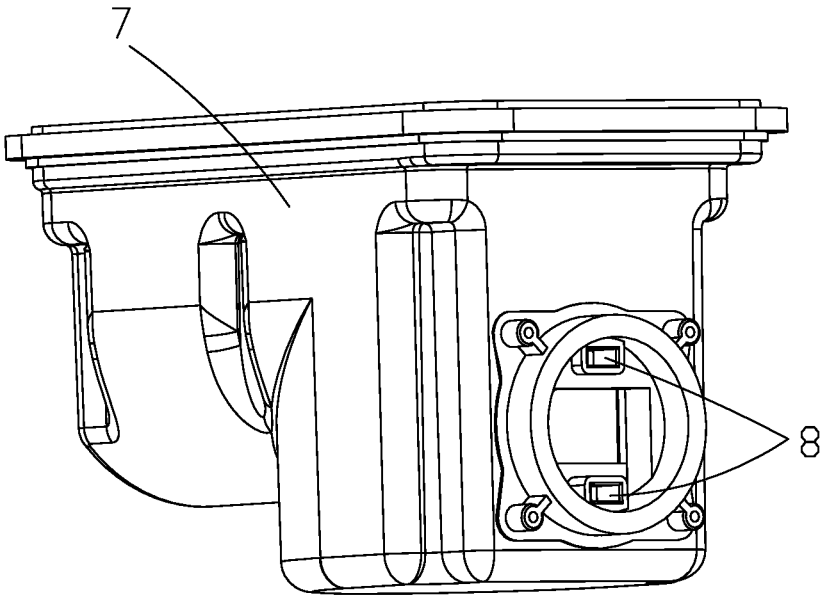


FIGURE 6

AIR PUMP

FIELD OF THE INVENTION

[0001] The present invention relates to an air pump.

BACKGROUND OF THE INVENTION

[0002] At present, there are many inflatable products on the market, such as inflatable cushions and so on. These products are usually equipped with an air pump inside the cushions. The air pump has an air inlet and an air outlet, while inflating, the air outlet is opened so that the pumping assembly can pump the air into the product, and when it is full, the air outlet is closed so as to prevent the air from leaking out. However, the sealing assemble for sealing the air outlet on the air pump on the market is complicated in structure, and the movement is not smooth while opening or closing the air outlet, and it is easy to be stuck, the sealing effect is so poor that dust and impurities are easily entered, which may shorten the service life of the air pump.

[0003] Therefore, the present invention is based on the above deficiencies.

SUMMARY OF THE INVENTION

[0004] In order to overcome the deficiencies of the prior art, the object of the present invention is to provide an air pump that has a simple structure and smooth movement without stagnation when the air outlet is opened or closed.

[0005] The present invention is realized by the following technical solution:

[0006] An air pump, comprising a housing **1**, the housing **1** is provided with an air inlet **2** and an air outlet **3**, a pumping assembly **4** is disposed inside the housing **1** enabling the air to flow between the air inlet **2** and the air outlet **3**, wherein the housing **1** is connected with a sealing assembly **5** capable of sealing the air outlet **3**, and a rotary bracket **6** is also disposed inside the housing **1**, capable of driving the sealing assembly **5** to open or close the air outlet **3** when rotating, the sealing assembly **5** includes a cover body **51** fixedly connected to the housing **1** and the cover body **51** is provided with an airflow passage **52** communicating with the air outlet **3**, the sealing assembly **5** further includes a sealing bracket **53** capable of being pushed by the rotary bracket **6** and sliding horizontally relative to the housing **1** when the rotary bracket **6** rotates, the sealing bracket **53** includes a sealing body **531** provided with at least two contacting bars **532** of an array in a circumferential direction connected with the rotary bracket **6**, the sealing bracket **53** is provided with a sealing ring **54** capable of being contacted with the housing **1** hermetically and being detached from the housing **1** when the sealing bracket **53** slides, a spring **55** for pressing the sealing bracket **53** toward the housing **1** is disposed between the sealing body **531** and the cover body **51**.

[0007] In the air pump, the spring **55** is located at the outside of the housing **1**.

[0008] In the air pump, the rotary bracket **6** connected with a rotary button **7** which is exposed out of the housing **1**.

[0009] In the air pump, the air inlet **2** is arranged on the rotary button **7**.

[0010] In the air pump, the rotary bracket **6** includes a rotary body **61** provided with a concave groove **62**/concave grooves **62**, and the concave groove **62** has an inclined groove wall or a cambered groove wall, when the rotary bracket **6** rotates, the groove wall of the concave groove **62** pushes/the groove walls of the concave grooves **62** push the sealing bracket **53** to move horizontally.

[0011] In the air pump, the pumping assembly **4** is provided on the rotary bracket **6**.

[0012] In the air pump, the housing **1** is provided with guiding holes **8**, and the contacting bars **532** pass through the guiding holes **8** respectively.

[0013] In the air pump, the sealing ring **54** includes an annular ring body **541** having two annular sealing convex ribs **542** projecting to one side, and an annular gap **543** is formed between the two sealing convex ribs **542**.

[0014] In the air pump, the hardness of the sealing convex ribs **542** is lower than the hardness of the ring body **541**.

[0015] Compared with the prior art, this invention has the following advantages:

[0016] 1. In the invention, when the inflatable product is inflated, the rotary bracket rotates and pushes the contacting bars of the sealing bracket during the rotation process, making the sealing bracket to slide laterally relative to the housing, and the spring is further compressed, at this point, the sealing ring of the sealing bracket is detached from the housing to open the air outlet, thus the pumping assembly operates to inflate from the air inlet to the air outlet. Since at least two contacting bars of an array in a circumferential direction connected to the rotary bracket are arranged on the sealing body, the sealing bracket moves very smoothly when it slides laterally, and no deflection or stagnation occurs. The air outlet is evenly opened, making the inflation or deflation time shorter, so that the air pump operates stably and reliably, and due to the smooth movement of the sealing bracket, the contact portion between the sealing ring and the housing does not appear to be loose or tight in some position, which ensures the good sealing effect of the sealing ring on the air outlet.

[0017] 2. In the invention, the rotary bracket includes a rotary body provided with a concave groove/concave grooves, and the groove has an inclined groove wall or a cambered groove wall. When the air outlet is sealed, the end of the each contacting bar is located in the groove, at this time the spring is pressed against the sealing bracket, thus bring the sealing ring into close contact with the housing to seal the air outlet. When the rotary bracket rotates, the inclined groove wall or the cambered groove wall presses the contacting bars, so that the sealing bracket moves back and the sealing ring is disengaged from the housing to open the air outlet, the spring is further compressed. Therefore, as long as the rotary bracket rotates, the air outlet can be opened or sealed, and the rotary bracket is also connected with a rotary button which is exposed out of the housing for convenient and quick operation of rotating the rotary bracket manually.

[0018] 3. In the invention, the sealing ring includes an annular ring body having two annular sealing convex ribs projecting to one side, and an annular gap is formed between two sealing convex ribs. Through the contact between two sealing convex ribs and the outer portion of the air outlet of the housing, two ring contacts are formed to achieve the double sealing effect, and the sealing effect is better. The arrangement of the annular gap can also prevent the impurity and

dust from entering the interior of the housing, avoiding the contamination of the internal components of the housing and ensuring longer service life of the air pump.

[0019] 4. In the invention, the hardness of the sealing convex ribs is lower than the hardness of the ring body. Therefore, the harder ring body has sufficient support force to support the spring force of the spring, so that the sealing ring is pressed tightly against the housing to seal the air outlet. And the softer sealing convex ribs have good elasticity, when it is pressed by the harder ring body, it is more easily deformed to seal the air outlet, which can effectively prevent dust from entering the inside of the sealing convex ribs and achieve better sealing effect.

[0020] 5. The invention has the advantages of simple structure, smooth movement without stagnation, good sealing effect, and is suitable for popularization and application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. **1** is a perspective view of the invention;

[0022] FIG. **2** is a sectional view of the invention;

[0023] FIG. **3** is an enlarged view of part A in FIG. **2**;

[0024] FIG. **4** is a sectional view of the sealing ring of the invention;

[0025] FIG. **5** is an exploded view of the invention;

[0026] FIG. **6** is a perspective view of the housing of the invention.

DETAILED DESCRIPTION

[0027] The present invention will be further described below in conjunction with the **110** drawings:

[0028] As shown in FIG. **1** to FIG. **5**, an air pump, comprising a housing **1**, the housing is provided with an air inlet **2** and an air outlet **3**, a pumping assembly **4** is disposed inside the housing **1** enabling the air to flow between the air inlet **2** and the air outlet **3**, wherein the housing **1** is connected with a sealing assembly **5** capable of sealing the air outlet **3**, and a rotary bracket **6** is also disposed inside the housing **1**, capable of driving the sealing assembly **5** to open or close the air outlet **3** when rotating, the sealing assembly **5** includes a cover body **51** fixedly connected to the housing **1** and provided with an airflow passage **52** communicating with the air outlet **3**, the sealing assembly **5** further includes a sealing bracket **53** capable of being pushed by the rotary bracket **6** and sliding horizontally relative to the housing **1** when the rotary bracket **6** rotates, the sealing bracket **53** includes a sealing body **531** provided with at least two contacting bars **532** of an array in a circumferential direction connected with the rotary bracket **6**, the sealing bracket **53** is provided with a sealing ring **54** capable of being in sealing contact with the housing **1** and being detached from the housing **1** when the sealing bracket **53** slides, a spring **55** for pressing the sealing bracket **53** toward the housing **1** is disposed between the sealing body **531** and the cover body **51**. To inflate, the rotary bracket **6** rotates and pushes the contacting bar **532** of the sealing bracket **53** during the rotation process, making the sealing bracket **53** to slide laterally relative to the housing **1**, and when the spring **55** is further compressed, the sealing ring **54** of the sealing bracket **53** disengages from the housing **1** to open the air outlet **3**, thus the pumping assembly **4** operates to allow air to enter from the air inlet **2** and pass through the inside of the housing **1** from the air outlet **3**, flowing out into the inflatable product. When the inflation is completed, the rotary bracket is rotated again, the sealing bracket **53** is moved in the opposite direction, the spring **55** presses the sealing bracket **53**, and the sealing ring **54** is pressed against the housing **1** to seal the air outlet **3**, ensuring that the air in the inflatable product will not leak out. When the air inside the inflatable product needs to be exhausted by pumping the inflatable product, the rotary bracket **6** is rotated again to make the sealing ring **54** disengage from the housing **1**. At this time, the air outlet **3** is opened, and the air inside the inflatable product is sequentially discharged through the air outlet **3**, the inside of the housing **1** and the air inlet **2**. The pumping assembly **4** is prior art and will not be described herein. Since the sealing body **531** is provided with at least two contacting bars **532** of an array in a circumferential direction connected with the rotary bracket **6**, the sealing bracket **53** moves very smoothly when it slides laterally, and no deflection or stagnation occurs. The air outlet **3** is evenly opened, making the inflation or deflation time shorter, so that the air pump operates stably and reliably, and due to the smooth movement of the sealing bracket **53**, the contact portion between the sealing ring **54** and the housing **1** does not appear to be loose or tight in some position, which ensures the good sealing effect of the sealing ring **54** on the air outlet **53**.

[0029] As shown in FIG. **3**, the spring **55** may be located at the outside of the housing **1**, therefore, when the air pump is assembled, the sealing bracket **53** and the sealing ring **54** may be assembled to the housing **1** first, then the spring **55** is assembled, and the cover body **51** is fixedly assembled to the housing **1** finally, which is simpler and more convenient to assemble. It is also convenient to replace and repair when the seal assembly **5** needs to be replaced and repaired. The spring **55** is always in a compressed state regardless of whether the air outlet **3** is opened or closed.

[0030] As shown in FIG. **1**, FIG. **2** and FIG. **5**, the rotary bracket **6** is connected with a rotary button **7** which is exposed out of the housing **1**. By rotating the rotary button **7** manually, the rotary bracket **6** can be conveniently rotated, thereby opening or sealing the air outlet **3**, which is very convenient and quick.

[0031] As shown in FIG. **1** and FIG. **5**, the air inlet **2** is arranged on the rotary button **7**, and the structure is simpler and the production is more convenient.

[0032] As shown in FIG. **5**, the rotary bracket **6** may include a rotary body **61** provided with a concave groove **62**/concave grooves **62**, and the concave groove **62** has an inclined groove wall or a cambered groove wall, when the rotary bracket **6** rotates, the groove wall of the concave groove pushes/the groove walls of the concave grooves **62** push the sealing bracket **53** to move horizontally. When the air outlet **3** is sealed, the end of each contacting bars **532** is located in the concave groove **62** correspondingly, at this time the spring **55** is pressed against the sealing bracket **53**, thus bring the sealing ring **54** into close contact with the housing **1** to seal the air outlet **3**. When the rotary bracket **6** rotates, the inclined groove wall or the cambered groove wall of the concave groove **62** presses the contacting bar **532**, so that the sealing bracket **53** moves back and the sealing ring **54** is disengaged from the housing **1** to open the air outlet **3**, the spring **55** is further compressed. Therefore, as long as the rotary bracket **6** rotates, the air outlet can be

opened or sealed, the structure is simple and the design is ingenious. When the air outlet **3** is sealed, the end of each contacting bar **532** is located in the concave groove **62**, the concave groove **62**/grooves **62** also serves/serve to position the sealing bracket **53** at the same time, so that the entire air pump structure is simple and compact, and the rotating bracket **6** is also connected with a rotary button **7** exposed out of the housing **1**, which is very convenient and quick to operate manually.

[0033] As shown in FIG. **5**, the pumping assembly **4** is disposed on the rotary bracket **6**, making the structure of the entire air pump simpler and more compact.

[0034] As shown in FIG. **3** and FIG. **6**, the housing **1** is provided with guiding holes **8**, and the contacting bars **532** pass through the guiding holes **8** respectively. Therefore, when the sealing bracket **53** slides, it is operated more smoothly and reliably.

[0035] As shown in FIG. **4**, the sealing ring **54** may include an annular ring body **541** having two annular sealing convex ribs **542** projecting to one side, and an annular gap **543** is formed between the two sealing convex ribs **542**. Through the contact between two sealing convex ribs **542** and the outer portion of the air outlet **3** of the housing **1**, two ring contacts are formed to achieve the double sealing effect, and the sealing effect is better. The arrangement of the annular gap **543** can also prevent the impurity and dust from entering the interior of the housing **1**, avoiding the contamination of the internal components of the housing **1**.

[0036] As shown in FIG. **4**, the hardness of the sealing convex ribs **542** is lower than the hardness of the ring body **541**. Therefore, the harder ring body **541** has sufficient support force to support the spring force of the spring **55**, so that the sealing ring **54** is pressed tightly against the housing to seal the air outlet **3**. And the softer sealing convex ribs **542** have good elasticity, when it is pressed by the harder ring body **541**, it is more easily deformed to seal the air outlet **3**, which effectively prevent dust from entering the inside of the sealing convex ribs **542** and achieve better sealing effect.

1. An air pump, comprising a housing, the housing is provided with an air inlet and an air outlet, a pumping assembly is disposed inside the housing enabling the air to flow between the air inlet and the air outlet, wherein the housing is connected with a sealing assembly capable of sealing the air outlet, and a rotary bracket is also disposed inside the housing, capable of driving the sealing assembly to open or close the air outlet when rotating, the sealing assembly includes a cover body fixedly connected to the housing and the cover body is provided with an airflow passage communicating with the air outlet, the sealing assembly further includes a sealing bracket capable of being pushed by the rotary bracket and sliding horizontally relative to the housing when the rotary bracket rotates, the sealing bracket includes a sealing body provided with at least two contacting bars of an array in a circumferential direction connected with the rotary bracket, the sealing bracket is provided with a sealing ring capable of being in sealing contact with the housing and being detached from the housing when the sealing bracket slides, a spring for pressing the sealing bracket toward the housing is disposed between the sealing body and the cover body.

2. The air pump according to claim **1**, wherein the spring is located at the outside of the housing.

3. The air pump according to claim **1**, wherein the rotary bracket connected with a rotary button which is exposed out of the housing.

4. The air pump according to claim **3**, wherein the air inlet is arranged on the rotary button.

5. The air pump according to claim **1**, wherein the rotary bracket includes a rotary body provided with a concave groove/concave grooves, and the concave groove has an inclined groove wall or a cambered groove wall, when the rotary bracket rotates, the groove wall of the concave groove pushes/the groove walls of the concave grooves push the sealing bracket to move horizontally.

6. The air pump according to claim **5**, wherein the pumping assembly is disposed on the rotary bracket.

7. The air pump according to claim **1**, wherein the housing is provided with guiding holes, and the contacting bars pass through the guiding holes respectively.

8. The air pump according to claim **1**, wherein the sealing ring includes an annular ring body having two annular sealing convex ribs projecting to one side, and an annular gap is formed between the two sealing convex ribs.

9. The air pump according to claim **8**, wherein the hardness of the sealing convex ribs is lower than the hardness of the ring body.

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