(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 911 524 A1

# (12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
**16.04.2008 Bulletin 2008/16**

(51) Int Cl.:
***B05B 7/08*** *(2006.01)* *B05B 7/12* *(2006.01)*

(21) Application number: **07118410.5**

(22) Date of filing: **12.10.2007**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR**
Designated Extension States:
**AL BA HR MK RS**

(30) Priority: **12.10.2006 CN 200610096733**

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## (54) Adjustable paint spray gun

(57) The present invention teaches an easily-adjustable paint spray gun, belonging to the domain of spraying equipment technology. The joints on the body (5) of the paint spray gun are connected to the spray mouth via the inner channels; a central spray orifice is opened on the spray nozzle at the spray mouth; a circular space connected with air flow channel is formed around the spray mouth; a spray head (1) is installed in front of the circular space, and is fixed at the gun head through a hold-down nut (3); a plurality of air spray orifices (10) distributed circularly uniformly is formed on the spray head; a ring baffle (2) is located between the front of the circular space and the spray head; at least two sets of through holes (13,14,15) are opened on the ring baffle; a notch (17) is opened at one side of the hold-down nut; a shift lever (11) is extended from the radial direction of the ring baffle and protrudes out of said notch after assembly; when the shift lever is housed in the first and second positions respectively, the two sets of through holes connects the up and down spray orifices and the left and right spray orifices with the circular space, respectively.

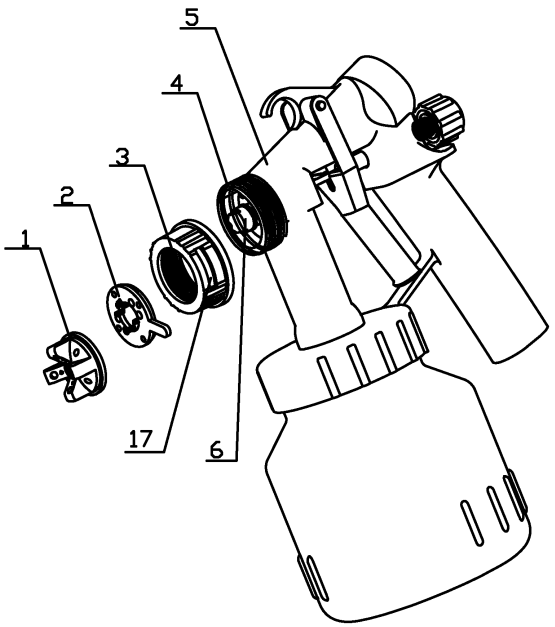


Fig. 1

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## Description

**[0001]** Field of the Invention

**[0002]** The invention relates to a spray gun, and more particularly, to a spray gun structure improvement for spraying paint, belonging to the domain of spraying equipment technology.

**[0003]** Description of the Related Art

**[0004]** Paint spray gun is a common device in spraying industry, with a typical structure comprising a gun body connected with an air pipeline and a paint pipeline communicating with the spray mouth. The central spray orifice at the spray mouth is connected with the paint-air mixture flow channel, and the orifices around are connected with the air flow channel. When spraying, the compressed air drives the paint to spray out through the central orifice, and then atomizes the paint to form a spray. The air sprayed out through the orifices around can not only refine the spray further, but more importantly, can control the paint spray pattern. For example, when the orifices at the left and right sides of the central orifice are utilized, the spray from the central orifice forms a longitudinal sector pattern to ease the horizontal spraying operation; and when the orifices at the upper and lower sides of the central orifice are utilized, the spray from the central orifice forms a transverse sector pattern to ease the vertical spraying operation.

**[0005]** For a conventional paint spray gun, the spray head needs to be changed in order to obtain different spraying patterns. An improved spray gun can realize different spraying patterns by rotating the spray head to a certain angle, but the operation is not convenient enough, and it is easy to spot the hands of the operator, causing trouble.

**[0006]** Chinese Patent Application No. 96244310 filed Nov. 20, 1996 discloses a nozzle structure for a paint spray gun, comprising a nozzle tubular body, a first circular body, and a second circular body, wherein the first circular body and the second circular body are tightly spaced on the tubular body of the nozzle. A circular space is thus formed between the two circular bodies. A plurality of through holes parallel to the axial direction of the nozzle tubular body are formed on each circular body, respectively. The through holes on the two circular bodies are alternating with respect to each other. When in operation, although the air inside of the paint spray gun enters into one side of the second circular body in a non-uniform mode, it behaves uniformly inside of the circular space, and then is sprayed out from the through holes of the first circular body. Therefore, a uniform and stabilized flow is obtained and produces a uniformly-atomized effect.

**[0007]** Another Chinese Patent Application No. 01215417 filed Feb. 27, 2001 discloses a paint spray head comprising a handle and a spray nozzle, wherein a paint channel is located inside the handle; at least three spray orifices, a circular paint channel communicated with the paint channel, an anti-block groove, and a bayonet are set on the spray nozzle; a cavernous body is inlaid on each of the two side edges of the nozzle, respectively. Though the above patents have improved beneficially the spraying performance and quality of the paint spray gun, the problem of how to control the paint spray pattern easily has not been addressed.

**[0008]** Therefore, the technical objective of the present invention is to surmount the disadvantages mentioned above, and through the improvement of the spray mouth structure, to provide an easily adjustable paint spray gun capable of easily adjusting and controlling the spray pattern without replacing and/or rotating the spray head, so as to provide a convenient spraying operation and ensure an improved spraying quality.

**[0009]** To realize the above objective, the gun body of the easily adjustable paint spray gun of the present invention is installed with joints for air pipeline and paint pipeline, respectively, wherein the joints are connected to the spray mouth at the spray gun head via the internal channel of the gun body. A central spray orifice is formed on the front spray nozzle of the spray mouth to connect with the paint-air flow channel. A circular space to connect with the air flow channel is formed around the central spray orifice. A spray head is installed in front of the circular space, and is fixed on the gun head through hold-down nut. The spray nozzle protrudes out of the central orifice of the spray head. A plurality of air spray orifices is formed on the spray head.

**[0010]** The improvements of the present invention are as follows. A ring baffle is located between the front portion of the circular space and the spray head. At least two sets of through holes are formed on the ring baffle. A notch is located at one side of the hold-down nut. A shift lever is extended along the radial direction of the circular baffle, and protrudes out of the notch after assembly. At least two regulating positions are formed for the shift lever corresponding to the notch. When the shift lever is at the first position, the first set of through holes serves to connect the air spray orifices distributed at the up and down positions of the spray head with the circular space. When the shift lever is at the second position, the second set of through holes serves to connect the air spray orifices at the left and right positions of the spray head with the circular space

**[0011]** It is easy to understand that, when using the easily adjustable paint spray gun of the present invention for paint spraying operation, the spray pattern can be easily adjusted by merely switching the baffle according to demand so as to place the shift lever in the first or second position. For example, when the air orifices at the left and right sides of the central orifice are on, the spray from the central orifice will form a longitudinal sector pattern to enable the horizontal spraying operation. When the air orifices at the up and down sides of the central orifice are on, the spray from the central orifice will form a transverse sector pattern to enable the vertical spraying operation. In both cases, the spray head does not need to be replaced or rotated, therefore, the adjustment and control is easy and convenient and helps to

ensure the spraying quality, especially for for complex spraying jobs.

**[0012]** This and other aspects of the easily adjustable paint spray gun according to this invention will be explained in more detail with reference to the drawings, in which:

Fig. 1 illustrates in an exploded view the a three-dimensional structure of an embodiment of an easily adjustable paint spray gun according to one embodiment of the present invention;

Fig. 2 shows a front view of a ring baffle according to the embodiment of the invention illustrated of Fig. 1;

Fig. 3 shows a top view of the ring baffle illustrated in Fig. 2;

Fig. 4 shows a back view of the ring baffle illustrated in Fig. 2;

Fig. 5 shows a front view of a spray head according to the embodiment illustrated in Fig. 1;

Fig. 6 shows a top view of the spray head according to the embodiment illustrated in Fig. 5; and

Fig. 7 shows a back view of the spray head according to the embodiment illustrated in Fig. 5.

**[0013]** The easily adjustable paint spray gun of one embodiment of the invention is a manual operated air spray gun. As illustrated in Fig. 1, a joint under the handle of the gun body 5 serves to connect with a compressed air pipeline. The paint pipeline joint under the gun body serves to connect with the paint tank. The compressed air is connected to the spray mouth of the spray head via the internal channel of the gun body. Since the paint tank is also connected to the spray mouth of the spray head via the internal channel of the gun body, when the compressed air is introduced, the Venturi effect will occur at the inner channel just above the paint tank so as to inlet the paint liquid to the channel, where the paint is mixed with the compressed air, and is sprayed through the central spray orifice of the front spray nozzle 6 at the spray mouth. The trigger installed on the gun body 5 acts as switch to control the on and off of the compressed air.

**[0014]** A circular space connected with the air channel is formed around the spray nozzle 6. A ring baffle 2 and a spray head 1 are installed in front of the circular space. A coverlike hold-down nut 3 is engaged with the thread 4 at the external portion of the circular space so as to hold down and fix the spray head 1. After assembly, the spray nozzle 6 extends out from the central orifice of the spray head 1. The ring baffle 2 is disposed between the front portion of the circular space and the spray head 1. A notch 17 is provided at one side of the hold-down nut. A shift lever 11 extends out along the radial direction of the ring baffle 2 (as shown in Figs. 2-4), and protrudes out of the notch 17 after assembly.

**[0015]** Figs. 5-7 show a specific structure of the spray head 1. Four radial bossed projections 8 are set uniformly on the hollow base 7, and an inwardly dished slope is formed on each projection from the peripheral circumference to the circle center. Four outlet orifices corresponding to the four projections are formed on the bottom side of the base 7, and are connected to the four big air spray orifices 10-1, 10-2, 10-3, and 10-4 on the slope, respectively, and also are connected to the corresponding four small air spray orifices 10-5, 10-6, 10-7, and 10-8, respectively. Besides, it can be seen from Fig. 7 that the four outer ring air spray orifices 9-1, 9-2, 9-3, and 9-4 are opened at the angular position of each two adjacent outlet orifices. Three positioning grooves 16-1, 16-2, and 16-3 are set at the angular position near the inner ring of two certain adjacent outlet orifices.

**[0016]** Figs. 2-4 illustrate a specific structure of a ring baffle 2. A first set of through holes 13-1, 13-2 and a second set of through holes 14-1, 14-2 are set symmetrically at the position on the ring baffle 2 corresponding to the radial position of the air outlet of the spray head. In addition, a third set of through holes 15-1, 15-2, 15-3, and 15-4 corresponding to the four outer ring air spray orifices 9-1, 9-2, 9-3, and 9-4, respectively, is set at the radial position of the ring baffle 2. A positioning projection 12-5 is formed on the inner ring at a position corresponding to the positioning grooves of the spray head. A separating notch is set at the two sides of the positioning projection to make the positioning projection 12-5 presenting in a cantilever status extended from the inner ring of the ring baffle, so that a good-hand fit can be obtained by a slightly upswept elastic deformation produced when toggling to help with precise positioning.

**[0017]** After assembly, an effect similar to the valve switching can be obtained by toggling the shift lever exposed out of the hold-down nut. When the positioning projection 12-5 on the shift lever is housed in the position groove 16-3 of the spray head, the first set of through holes 13-1, 13-2 serves to connect the up and down air outlets on the spray head with the circular space at the gun head, and the left and right air outlets and the outer ring air spray orifices are closed, so that the four air spray orifices 10-2, 10-6, 10-4, and 10-8 spray compressed air when in the process of spraying so as to form a horizontal sector spray pattern. When the positioning projection 12-5 is housed in the positioning groove 16-1 of the spray head, the second set of through holes 14-1, 14-2 serves to connect the left and right air outlets with the circular space, and the up and down air outlets and the outer ring air spray orifices are closed, so that the four air spray orifices 10-1, 10-5, 10-3, and 10-7 spray compressed air when in the process of spraying so as to form a vertical sector spray pattern. When the positioning projection 12-5 is housed in the positioning groove 16-2 of the spray head, the third set of through holes 15-1, 15-2, 15-3, and

15-4 serves to connect the four outer ring air spray orifices on the spray head with the circular space, and the various air outlets are closed so that the four outer ring air spray orifices 9-1, 9-2, 9-3, and 9-4 spray compressed air when in process of spraying so as to form a cone spray pattern.

**[0018]** Besides the projection 12-5, four uniformly distributed up-down jaws 12-1, 12-2, 12-3, and 12-4 extending to the two end faces are also formed on the inner ring of the ring baffle 2. When assembling, the up-down jaws are engaged with the bottom face of the spray head base 7 and the inner circle of the central orifice corresponding to the hold-down nut, respectively, serving to limit radial spacing to ensure the concentricity of the baffle with the spray head, and thus to align exactly the various required intercommunicating orifices after the shift lever is toggled.

**[0019]** By applying the easily-adjustable paint spray gun of the present invention, three different spray patterns of horizontal sector, vertical sector, and cone can be selected easily with the assistance of the shift lever, which is beneficial to guaranteeing the spraying quality, especially for complex spraying jobs. Experiments have shown that, with the match of big and small air spray orifices, not only can an ideal spray pattern be obtained, but also a good auxiliary atomization effect can be realized, and thus the spray can be more uniformly distributed. The presence of the outer ring air spray orifices increases the selection and control of cone shaped spray pattern, while the positioning apparatus allows for precise regulation to obtain an ideal handling and hand-fit.

**[0020]** It is clear that the present invention is not limited to the above embodiment. Other embodiments are also available to be included in this invention. For example, in another embodiment of the invention, the positioning grooves on the spray head can be changed to positioning projections, while the positioning projections on the baffle are changed to positioning grooves. In another embodiment of the invention, the number of sets of through holes and the number of positioning positions on the baffle can be increased to realize a greater number of spray patterns. In yet another embodiment of the invention, the baffle can also be applied to other paint spray guns. In yet another embodiment of the invention, the number of up-down jaws extending to the two end faces of the baffle on the inner ring of the positioning baffle can be more or less, or non-uniformly distributed; etc.

**[0021]** While particular embodiments of the invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects, and therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

## Claims

1. An adjustable paint spray gun, wherein the gun body of the paint spray gun of the present invention is installed with joints for air pipeline and paint pipeline, respectively, wherein said joints are connected to the spray mouth at the spray gun head via the internal channel of the gun body, a central spray orifice is formed on the front spray nozzle of said spray mouth to connect with the paint-air mixing flow channel, and a circular space to connect with the air flow channel is formed around the central spray orifice, a spray head is installed in front of said circular space, and is fixed on the gun head through hold-down nut, said spray nozzle protrudes out of the central orifice of said spray head, a plurality of air spray orifices is formed on said spray head, the improvements of the present invention are **characterized in that**: a ring baffle is located between the front portion of said circular space and said spray head; at least two sets of through holes are formed on said ring baffle; a notch is located at one side of said hold-down nut; a shift lever is extended along the radial direction of said circular baffle, and protrudes out of said notch after assembly; at least two regulating positions are formed for said shift lever corresponding to said notch, when the shift lever is at the first position, the first set of through holes serves to connect the air spray orifices distributed at the up and down positions of said spray head with the circular space, and when the shift lever is at the second position, the second set of through holes serves to connect the air spray orifices at the left and right positions of said spray head with the circular space.

2. The adjustable paint spray gun of claim 1, wherein a plurality of outer ring air spray orifices is set at the angular position of two adjacent air spray orifices on said spray head, a third set of through holes is formed on said ring baffle corresponding to the radial position of outer ring air spray orifices of the spray head, said shift lever has a third position corresponding to the notch, when the shift lever is housed in the third position, the third set of through holes of said ring baffle connects the outer ring air spray orifices of said spray head with the circular space.

3. The adjustable paint spray gun of claim 2, wherein a groove/projection positioning structure having three selections is formed near the inner ring of said spray head, a corresponding projection/groove positioning structure is formed at the inner ring of said ring baffle.

4. The adjustable paint spray gun of claim 3, wherein a separating notch is opened at the two sides of the proj ection/groove positioning structure at the inner ring of said ring baffle, presenting in a cantilever sta-

tus extended from the inner ring of said ring baffle.

**5.** The adjustable paint spray gun of claim 3 or claim 4, wherein four radial bossed projections are set uniformly on the base of said spray head, an inwardly dished slope is formed on each projection from the peripheral circumference to the circle center; four air outlet orifices corresponding to the four projections are formed on the bottom side of said base, and are connected to the four big air spray orifices on the slope and the corresponding four small air spray orifices.

**6.** The adjustable paint spray gun of claim 5, wherein four uniformly distributed up-down jaws extending to the two end faces are also formed on the inner ring of said ring baffle.; when assembling, the up-down jaws are engaged with the bottom face of the spray head base and the inner circle of the central orifice corresponding to the hold-down nut, respectively.

**7.** The adjustable paint spray gun of claim 6, wherein said spray gun is a manual operated air spray gun, a joint under the handle of the gun body serves to connect with a compressed air pipeline, and the paint pipeline joint under the gun body serves to connect with the paint tank.

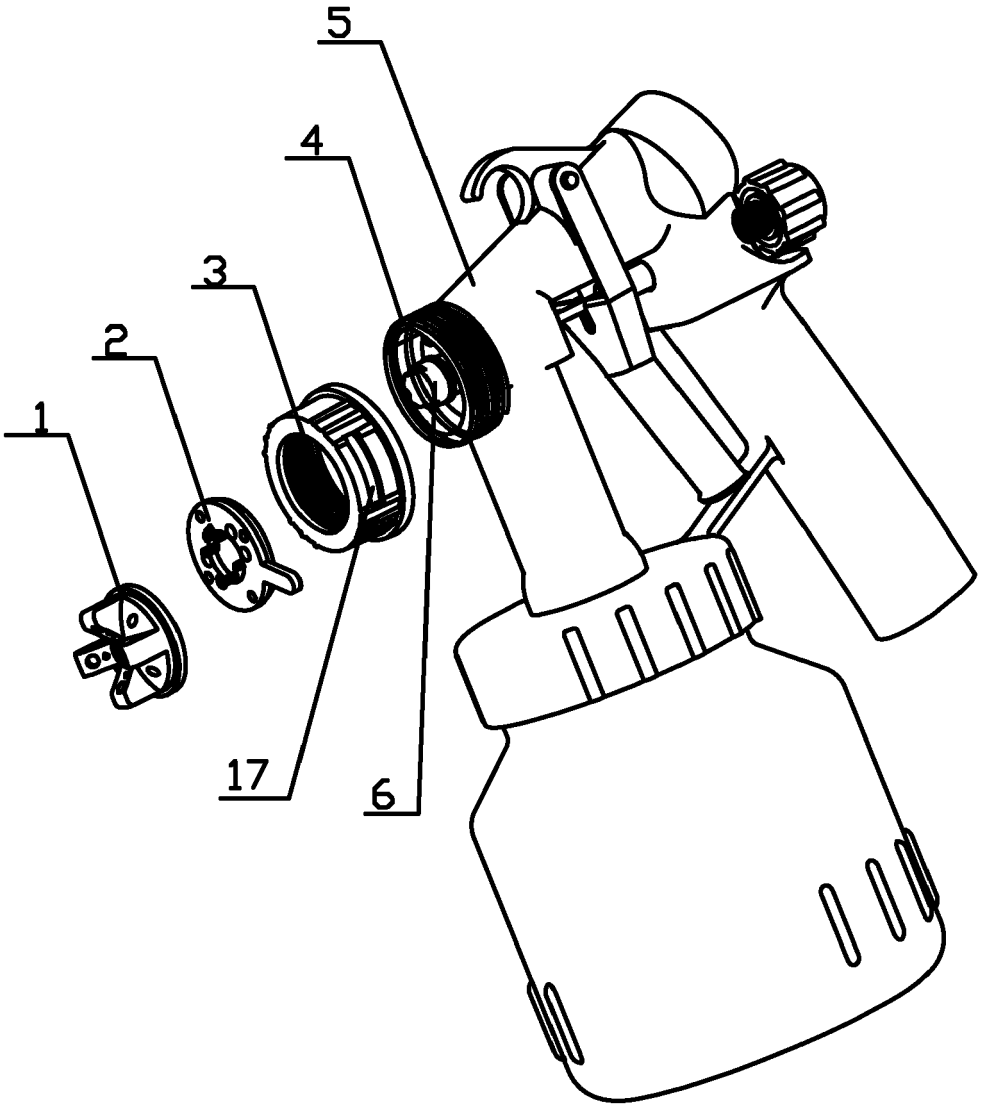


Fig. 1

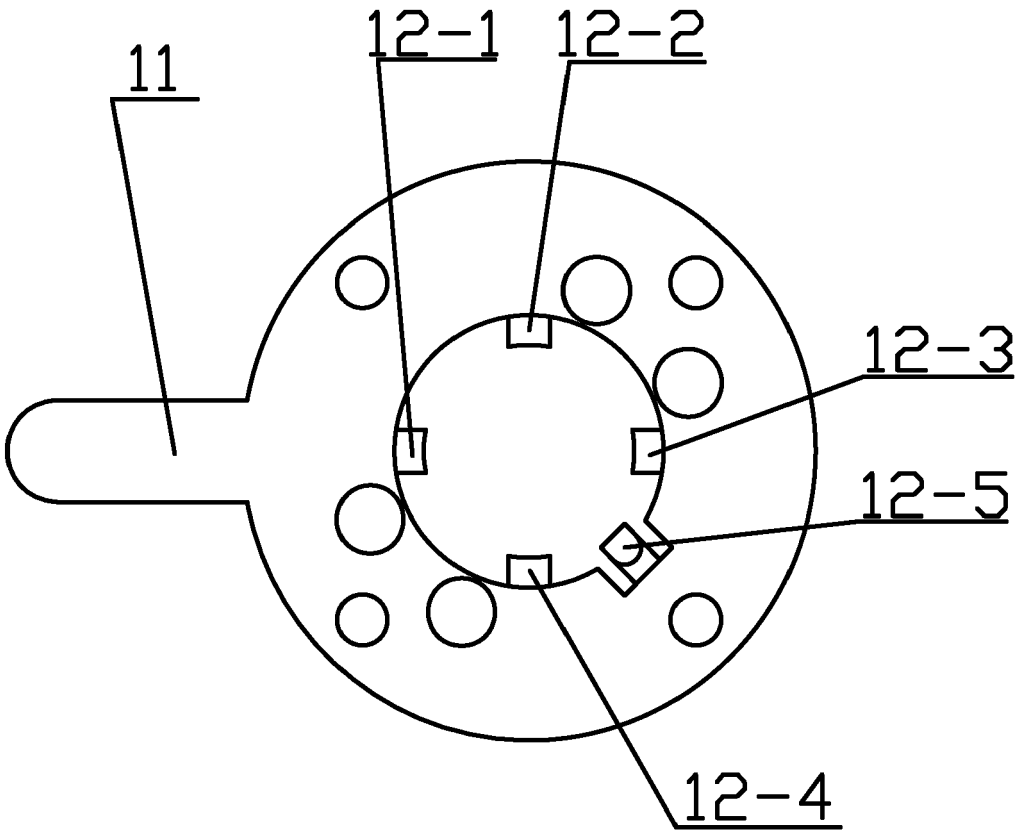


Fig 2

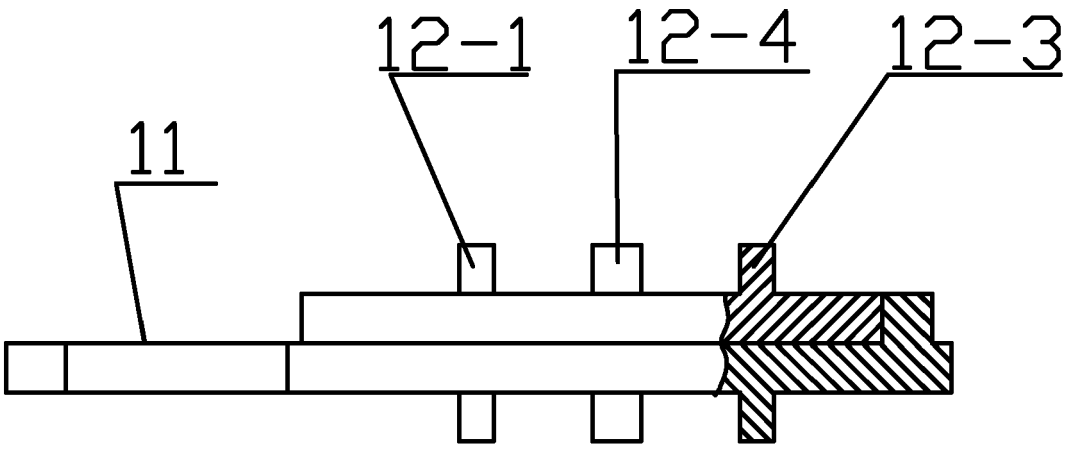


Fig. 3

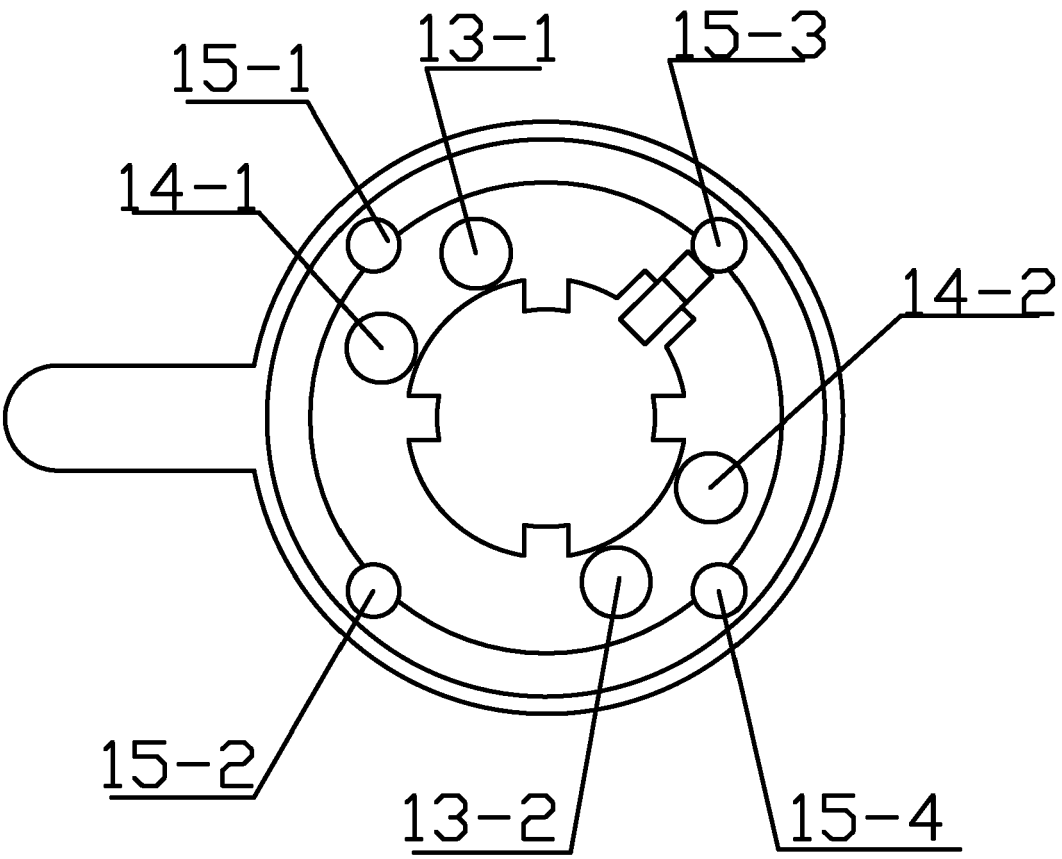


Fig. 4

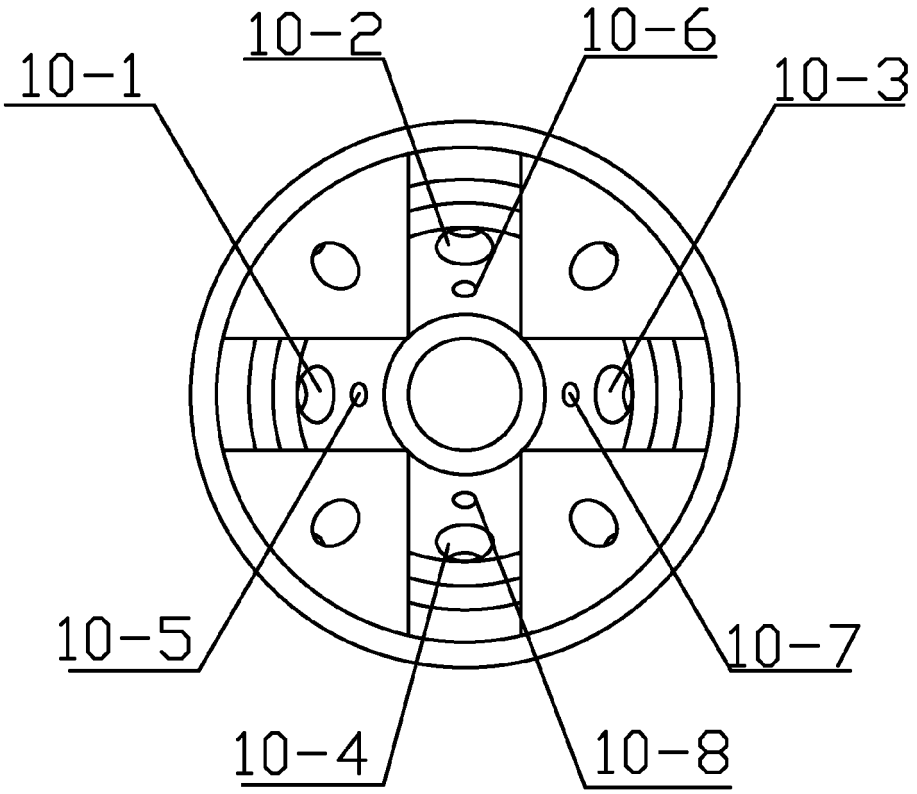


Fig. 5

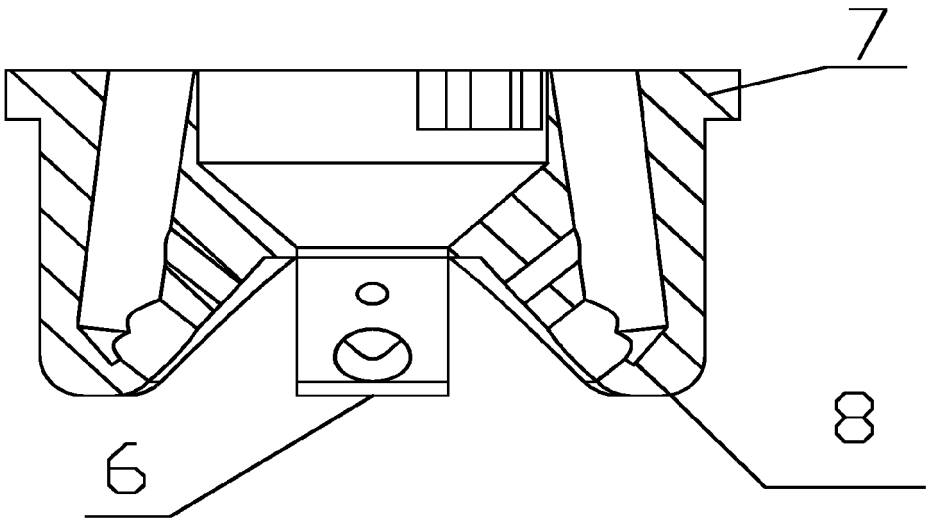


Fig. 6

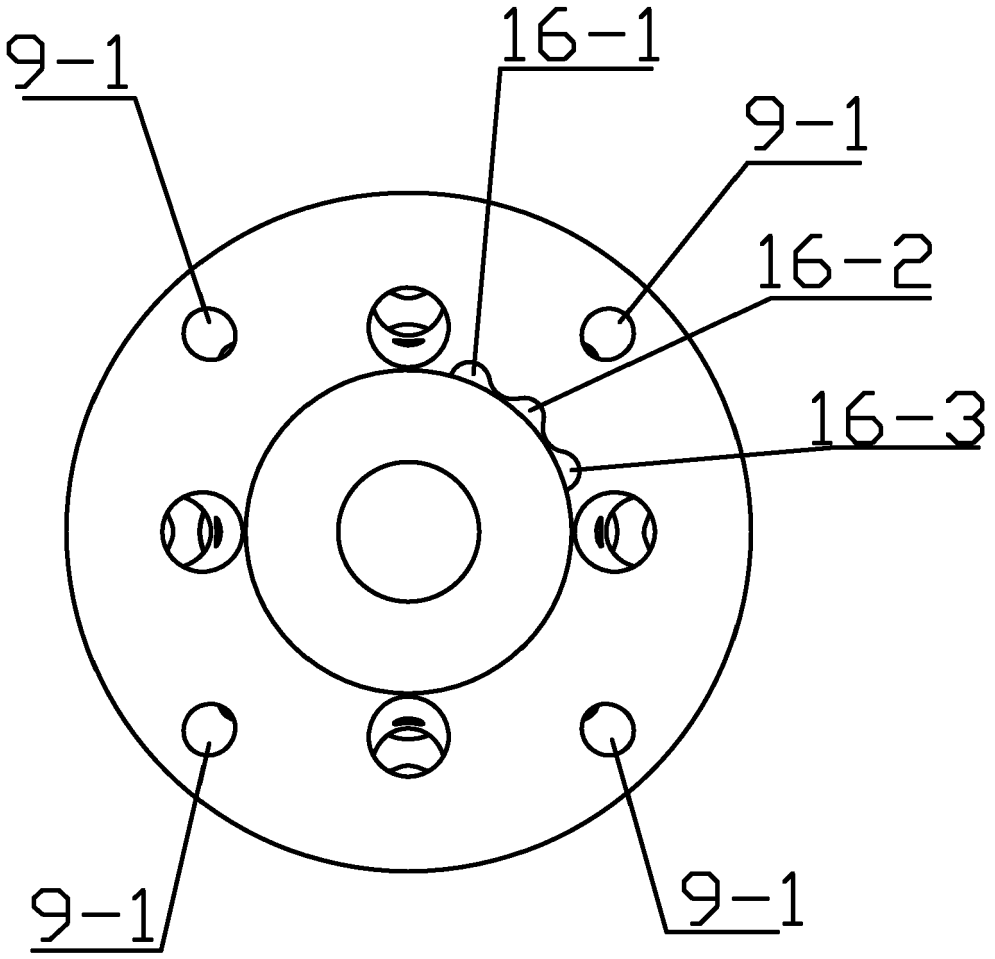


Fig. 7

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# EUROPEAN SEARCH REPORT

Application Number
EP 07 11 8410

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | US 4 531 675 A (MUCK JACK E [US])<br>30 July 1985 (1985-07-30) | 1,2 | INV.<br>B05B7/08 |
| A | * column 4, line 27 - column 5, line 34 *<br>* figures * | 3 | ADD.<br>B05B7/12 |
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TECHNICAL FIELDS SEARCHED (IPC)

B05B

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 12 November 2007 | Roldán Abalos, Jaime |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 11 8410

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## REFERENCES CITED IN THE DESCRIPTION

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