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(54) COLD FIREWORK EXCITATION DEVICE FOR COLD FIREWORK ERUPTION APPARATUS AND COLD FIREWORK ERUPTION APPARATUS

KALTFEUERWERKSERREGUNGSVORRICHTUNG FÜR KALTFEUERWERKSERUPTIONSVORRICHTUNG UND KALTFEUERWERKSERUPTIONSVORRICHTUNG

DISPOSITIF D'EXCITATION DE FEU D'ARTIFICE FROID POUR APPAREIL D'ÉRUPTION DE FEU D'ARTIFICE FROID, ET APPAREIL D'ÉRUPTION DE FEU D'ARTIFICE FROID

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Description

TECHNICAL FIELD

[0001] The present disclosure relates to a field of cold firework injection device, and in particular, to a cold firework excitation device for a cold firework ejection apparatus and a cold firework ejection apparatus including the cold firework excitation device.

BACKGROUND

[0002] Nowadays, most of the various stage performances are designed to set off the atmosphere by discharging cold fireworks such that the emergence of climax of the performances is promoted. Then desired results are achieved in stage effects.

[0003] At present, the cold fireworks discharged on the stage generally adopt a cold firework cartridge that can be discharged one time. The cold firework cartridge is filled with a mixture of gunpowder and metal powder and an ignition head device is placed in the cartridge. When the cold fireworks are discharged, the ignition head device is controlled by an electrical connection so that sparks are generated to ignite the gunpowder. The high temperature produced by the combustion of the gunpowder ignites the metal powder mixed therewith. The high pressure generated by the combustion of the gunpowder achieves the ejection of the burning metal powder to realize an effect of cold fireworks. Due to the presence of gunpowder, there are certain risks for this kind of cold firework cartridge during production, conveyance and discharge. The ignition head device used in this type cold firework cartridge is a dangerous explosive item and may be easily disassembled and used by criminals for illegal use resulting in public safety accidents. In addition, such a cold firework cartridge may produce relatively heavy smoke and gas with irritating odor when it is discharged, which may easily cause pollution of the environment. Since the cold fireworks discharged from such cold firework cartridges are all discharged one time, there are many disadvantages such as a short firework ejection time, an uncontrollable ejection time of the fireworks, and a non-recyclable cold firework cartridge.

[0004] CN 204 202 494 U discloses a cold firework excitation device for a cold firework ejection apparatus according to the preamble of claim 1.

[0005] CN 203 203 474 U discloses a wired remote controlled ejection type electronic firework firecracker.

SUMMARY

[0006] In view of the above, a main object of the present disclosure is to provide a cold firework excitation device for a cold firework ejection apparatus and a cold firework ejection apparatus, which do not use the dangerous gunpowder, have a long firework ejection time, have a controllable ejection time of the fireworks, and are recyclable.

[0007] According to the present invention defined in claim 1, there is provided a cold firework excitation device for a cold firework ejection apparatus including a heating mechanism for gradually heating metal powder during conveyance of the metal powder; an ignition mechanism for exciting and igniting the heated metal powder by means of airflow; and an ejection mechanism for ejecting the ignited metal powder by the airflow from the ignition mechanism; wherein an output end of the heating mechanism is communicated with the ignition mechanism; wherein an output end of the ignition mechanism is communicated with the ejection mechanism; wherein the airflow from the ignition mechanism is output toward the ejection mechanism; and wherein the ejection mechanism is provided with an ejection port.

[0008] Further, the heating mechanism includes: a conveying passage for conveying the metal powder; a material-urging screw provided in the conveying passage so as to continuously urge the metal powder entering from a feeding inlet along an inner wall surface of the conveying passage toward the ignition mechanism, and a heating ring that is closely fitted over an outer wall surface of the conveying passage and configured to gradually heat the metal powder. By controlling a gap between the material-urging screw and the conveying passage and controlling the rotational speed of the material-urging screw, the uniformity and continuity of the metal powder urged by the material-urging screw can be controlled, thereby controlling the stability and continuity of the flame and thus solving the problem of instability and discontinuity of the flame when being ejected by the cold firework ejection apparatus.

[0009] The heating ring is distributed in a direction from the feeding inlet to the ignition mechanism.

[0010] Further, a heat preservation sleeve for heat preservation and heat leakage prevention is sleeved outside of the heating ring; and at least one end of the conveying passage is provided with a heat insulating gasket for heat preservation and heat leakage prevention.

[0011] Further, the ignition mechanism includes: an ignition portion for communicating with the output end of the heating mechanism; and a blower for blowing air toward interior of the ignition portion. The heated metal powder is ejected outward from an ejection port of the ejection mechanism after being excited and ignited by means of the airflow provided by the ejection mechanism after being excited and ignited by means of the airflow provided by the blower.

[0012] Further, the blower is a speed-adjustable blower to control an ejection height of the cold fireworks.

[0013] Further, the ejection mechanism includes an outlet pipe that is communicated with an output end of the ignition portion; and the outlet pipe, the ignition portion, and the blower are arranged in a same axis.

[0014] Further, the outlet pipe and the ignition portion are integrally formed as a unitary structure.

[0015] Further, the heating mechanism is connected to a driving mechanism for driving the material-urging

screw to rotate.

[0016] Further, the heating mechanism, the ignition mechanism and the ejection mechanism are mounted to a same supporting member; the ignition mechanism and the ejection mechanism are coaxially arranged; and the heating mechanism is arranged in a direction perpendicular to axes of the ignition mechanism and the ejection mechanism.

[0017] According to another aspect of the present disclosure, there is also provided a cold firework ejection apparatus including the above-described cold firework excitation device for a cold firework ejection apparatus.

[0018] The beneficial effects of the present disclosure may be described as follows:

With the cold firework excitation device for the cold firework ejection apparatus according to the present disclosure, the metal powder is continuously heated by the heating mechanism in the process of conveying the metal powder so that the temperature of the metal powder gradually increases during conveyance. When the metal powder is conveyed from the heating mechanism to the ignition mechanism, the heated metal powder is excited and ignited by means of the blowing airflow, the metal powder of high temperature rapidly burns by means of the airflow and is ejected outward through the ejection port of the ejection mechanism, thereby providing the cold fireworks. There is no need for gunpowder in the whole process, and it is safe to be discharged and produces pollution free fumes. The metal powder is quickly cooled and extinguished after it is ejected without any safety hazards. As long as the raw material of the metal powder is sufficient, the ejection can be continuously performed; and the device can be repeatedly charged and erupted. The device according to the present disclosure is suitable for a variety of indoor and outdoor stages, and even for the interior of the home environment.

[0019] In addition to the above-described objects, features, and advantages, the present disclosure has other objects, features, and advantages. The present disclosure will be further described in detail with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The accompanying drawings constituting a part of the present application are used to provide a further understanding of the present disclosure, and the exemplary embodiments of the present disclosure and the description thereof are used to explain the present disclosure and do not constitute improper limitations to the present disclosure. In the drawing:

FIG. 1 is a schematic structural view of a cold firework excitation device for a cold firework ejection apparatus according to a preferred embodiment of the present disclosure;

FIG. 2 is a schematic structural view of an ignition mechanism and an ejection mechanism for a cold firework excitation device according to a preferred embodiment of the present disclosure; and

FIG. 3 is a schematic structural view of a feeding device for a cold firework ejection apparatus according to a preferred embodiment of the present disclosure.

Reference signs:

[0021] 1. heating mechanism; 101. conveying passage; 102. material-urging screw; 103. heating ring; 104. feeding inlet; 2. ignition mechanism; 201. ignition portion; 202. blower; 3. ejection mechanism; 301. outlet pipe; 4. ejection port; 5. metal powder; 6. funnel; 61. charging hopper; 62. controllable feeding pipe; 63. feeding shaft; 64. feeding driving motor; 7. heat preservation sleeve; 8. heat insulating gasket; 9. driving mechanism; 10. supporting member.

DETAILED DESCRIPTION OF EMBODIMENTS

[0022] To make the objectives, technical solutions, and advantages of the present disclosure more comprehensible, the present disclosure will be further described as follows in detail with reference to specific embodiments and with reference to the accompanying drawings.

[0023] FIG. 1 is a schematic structural view of a cold firework excitation device for a cold firework ejection apparatus according to a preferred embodiment of the present disclosure. As shown in FIG. 1, the cold firework excitation device for a cold firework ejection apparatus according to the present embodiment includes: a heating mechanism 1 for gradually heating metal powder 5 during conveyance of the metal powder; an ignition mechanism 2 for exciting and igniting the heated metal powder 5 by means of airflow; and an ejection mechanism 3 for ejecting the ignited metal powder 5 by the airflow from the ignition mechanism 2; an output end of the heating mechanism 1 is communicated with the ignition mechanism 2; an output end of the ignition mechanism 2 is communicated with the ejection mechanism 3; the airflow from the ignition mechanism 2 is output toward the ejection mechanism 3; and the ejection mechanism 3 is provided with an ejection port 4. With the cold firework excitation device for the cold firework ejection apparatus according to the present disclosure, the metal powder 5 is continuously heated by the heating mechanism 1 in the process of conveying of the metal powder 5 so that the temperature of the metal powder 5 gradually increases in the process of conveying. When the metal powder 5 is conveyed from the heating mechanism 1 to the ignition mechanism 2, the heated metal powder 5 is excited and ignited by means of the blowing airflow, the metal powder 5 of high temperature rapidly burns by means of the airflow and is ejected outward through the ejection port 4 of the ejection mechanism 3, thereby providing the cold fireworks. That is to say, after the metal powder 5 is gradually heated to a high temperature state (to a burning point) by the heat-

ing mechanism 1 during conveyance, it is brought into contact with the blowing airflow (air) and ignited, and then the ignited metal powder is ejected by means of the blowing airflow. As so, there is no need for gunpowder in the whole process, and it is safe for discharging and produces pollution free fumes. The metal powder 5 is quickly cooled and extinguished after it is ejected without any safety hazards. As long as the raw material of the metal powder 5 is sufficient in amount, the ejection can be continuously performed; and the device can be repeatedly charged and erupted. The device according to the present disclosure is adapted for a variety of indoor and outdoor stages, and even for the interior of the home environment. The metal powder 5 is formed by mixing metal powder in proportion. Preferably, the metal powder 5 is metal powder of at least one of aluminum, iron, strontium, magnesium, calcium, zirconium, copper, and titanium. The metal powder 5 may also be metal compound powder of at least one of aluminum, iron, strontium, magnesium, calcium, zirconium, copper, and titanium. Alternatively, the metal powder 5 may also be a mixed powder in which the metal powder described above is mixed with the above metal compound.

[0024] As shown in FIG. 1, in this embodiment, the heating mechanism 1 includes: a conveying passage 101 for conveying the metal powder 5; a material-urging screw 102 provided in the conveying passage 101 so as to continuously urge the metal powder 5 entering from feeding inlet 104 along an inner wall surface of the conveying passage 101 toward the ignition mechanism 2; and a heating ring 103 that is closely fitted over an outer wall surface of the conveying passage 101 and gradually heats the metal powder 5. A feeding passage for the metal powder 5 from the feeding inlet 104 to the ignition mechanism 2 is formed by the conveying passage 101. The rotation of the material-urging screw 102 provides a urging force on the metal powder 5 and forces the metal powder 5 to be always in a close contact to the inner wall surface of the conveying passage 101 and to be evenly distributed, so that the metal powder 5 can be uniformly heated by the heating ring 103 on the outer wall surface of the conveying passage 101. The heating ring 103 is distributed in a direction from the feeding inlet 104 to the ignition mechanism 2. The metal powder 5 may be continuously heated. Optionally, an outer diameter of the material-urging screw 102 may be the same as a dimension of the inner wall surface of the conveying passage 101, so that the metal powder 5 can be evenly distributed in each of grooves of the screw structure so as to be sufficiently heated. Optionally, the outer diameter of the material-urging screw 102 may be smaller than the dimension of the inner wall surface of the conveying passage 101 so that the amount of the metal powder 5 around the material-urging screw 102 is larger, thereby forming an ejection effect with a greater amount of fireworks.

[0025] As shown in FIG. 1, in the present embodiment, a heat preservation sleeve 7 for heat preservation and heat leakage prevention is sleeved outside of the heating ring 103. At least one end of the conveying passage 103 is provided with a heat insulating gasket 8 for heat preservation and heat leakage prevention.

[0026] In addition, FIG. 2 is a schematic structural view of an ignition mechanism and an ejection mechanism for a cold firework excitation device according to a preferred embodiment of the present disclosure.

[0027] As shown in FIG 1 and FIG. 2, in the present embodiment, the ignition mechanism 2 includes an ignition portion 201 for communicating with the output end of the heating mechanism 1 and a blower 202 for blowing air toward interior of the ignition portion 201. After the heated metal powder 5 is excited and ignited by means of the airflow provided by the blower 202, it is ejected outward from an ejection port 4 of the ejection mechanism 3. The metal powder 5 of high temperature is excited by the blowing airflow from the blower 202 so that the metal powder 5 of high temperature rapidly burns to form cold fireworks. Optionally, a blower outlet 203 located between the blower 202 and the ignition portion 201 is provided with a blower outlet heat insulating gasket a to prevent heat from being transferred to the blower and from causing a problem that the life of the blower is reduced due to a continuous high temperature. In this embodiment, the blower 202 may be a hot air blower, which may effectively reduce a cooling rate of the metal powder 5 and improve the ejection effect of the cold fireworks.

[0028] As shown in FIG. 1 and FIG. 2, in this embodiment, the blower 202 may be a blower whose rotational speed is adjustable to control an ejection height of the cold fireworks.

[0029] As shown in FIGs. 1 and 2, in the present embodiment, the ejection mechanism 3 includes an outlet pipe 301. The outlet pipe 301 is communicated with an output end (upper end) of the ignition portion 201. The outlet pipe 301, the ignition portion 201, and the blower 202 are arranged in a same axis. Thus, the airflow output from the blower 202 can be transported along a straight line, which can reduce the output power of the blower 202 and improve the ejection effect of the cold fireworks. Optionally, an outlet heat insulating gasket b is disposed on the outlet of the outlet pipe 301 so that the temperature of fireworks ejected from the outlet pipe 301 is reduced while the heat from the ignition mechanism 2 is prevented from being transferred outward.

[0030] As shown in FIG. 1 and FIG. 2, in the present embodiment, the outlet pipe 301 and the ignition portion 201 are integrally formed as a unitary structure, which results in a simple structure and an excellent structural integrity.

[0031] As shown in FIG. 1, in the present embodiment, the heating mechanism 1 is connected to a driving mechanism 9 for driving the material-urging screw 102 to rotate.

[0032] As shown in FIG. 1, in this embodiment, the heating mechanism 1, the ignition mechanism 2, and the ejection mechanism 3 are mounted onto a same supporting member 10. The ignition mechanism 2 and the ejec-

tion mechanism 3 are coaxially arranged so as to improve the ejection effect of the cold fireworks. The heating mechanism 1 is arranged in a direction perpendicular to axes of the ignition mechanism 2 and the ejection mechanism 3, so that the heated metal powder 5 can effectively transported, excited and ignited, and the excited and ignited metal powder 5 can be effectively ejected.

[0033] In addition, FIG. 3 is a schematic structural view of a feeding device for a cold firework ejection apparatus according to a preferred embodiment of the present disclosure.

[0034] As shown in FIG. 3, in the cold firework ejection apparatus according to the present disclosure, a feeding device for discharging materials into the conveying passage 101 of the heating mechanism 1 preferably includes, in addition to a funnel 6 for feeding the metal powder 5, a charging hopper 61 for storing the metal powder 5 and filling the funnel 6 with the metal powder 5. Between the lower part of the charging hopper 61 and the upper part of the funnel 6 is provided a rotatable feeding mechanism for continuously urging the metal powder 5 in the charging hopper 61 into the funnel 6 by means of a circumferential rotation. The rotatable feeding mechanism is mounted onto the charging hopper 61. An output end of the rotatable feeding mechanism faces toward the interior of the funnel 6, and an output end of the funnel 6 is communicated with the heating mechanism 1. In addition, the rotatable feeding mechanism includes: a controllable feeding pipe 62 for communicating the charging hopper 61 and the funnel 6; a feeding shaft 63 axially disposed in a cavity in the controllable feeding pipe 62 along the controllable feeding pipe 62 and for continuously conveying the metal powder 5 in the charging hopper 61 to the funnel 6 by means of rotation; and a feeding driving motor 64 for driving the feeding shaft 63 to rotate. A surface of the feeding shaft 63 is provided with a continuous spiral feeding projection configuration and/or a continuous spiral feeding depression configuration. The feeding shaft 63 is driven by the feeding driving motor 64 to rotate the metal powder 5 in the charging hopper 61, and the concave-convex structure on the surface of the feeding shaft 63 drives the metal powder 5 to enter the funnel 6 through the controllable feeding pipe 62. As a result, the feeding of the metal powder 5 is achieved. The amount of the metal powder 5 to be fed may be controlled by controlling a gap between the feeding shaft 63 and the controllable feeding pipe 62. The feeding speed of the metal powder 5 may be controlled by a rotational speed of the feeding shaft 63. Optionally, the feeding driving motor 64 may be a motor with an adjustable output speed. By changing the output rotational speed of the motor, the rotational speed of the feeding shaft 63 is controlled, thereby controlling the feeding speed and the feeding amount of the metal powder 5 to change the ejection effect of the cold fireworks.

[0035] A cold firework ejection apparatus according to the present embodiment includes the above-described cold firework excitation device.

[0036] According to the cold firework ejection apparatus according to the present disclosure, the metal powder 5 fed by the feeding device is uniformly and continuously dispersed over the surface and in the thread grooves of the material-urging screw 102 by means of the funnel 6 to increase a contact area between the metal powder 5 and the heating device (heating ring 103). Because of the heat preservation effect of the heat preservation sleeve 7 outside the heating ring 103, it is possible for the temperature in the heating area of the material-urging screw 102 to be maintained constant, thereby ensuring that the metal powder 5 can be fully ignited. Thus, the problem that the metal powder 5 cannot be fully ignited can be solved.

[0037] The screw structure of the material-urging screw 102 and the uniform rotational speed of the feeding driving motor (driving mechanism 9) can uniformly and continuously urge the metal powder 5 sliding down from the feeding inlet 104 opened on the conveying passage 101 to enter the heating device. By controlling the gap between the material-urging screw 102 and the conveying passage 101 and controlling the rotational speed of the material-urging screw 102, the uniformity and continuity of the metal powder 5 urged by the material-urging screw 102 can be controlled, thereby controlling the stability and continuity of the flame and thus solving the problem of unstability and discontinuity of the flame when being ejected by the cold firework ejection apparatus.

[0038] The heat preservation sleeve 7 for the heating ring 103 and the screw heat insulating gasket (the heat insulating gasket 8) can seal the heat from the heating ring 103 in the cavity formed by the heat preservation sleeve 7 and the screw heat insulating gasket a, not only ensuring the temperature in the heating area of the material-urging screw 102 to be maintained constant, but also making it possible to prevent heat transfer to other areas. Thus, a heat insulating effect is obtained, solving the problem of heat insulation during heating of the cold firework device.

[0039] When the ignited metal powder 5 arrives at the outlet pipe 301, the temperature of the metal powder 5 will be reduced due to being encountered with the cool air and the metal powder 5 will be extinguished, affecting the state and the appearance of the flame. Therefore, the blower outlet heat insulating gasket a and the outlet heat insulating gasket b are disposed at two ends of the outlet pipe 301 of the cold firework device. The blower outlet heat insulating gasket a and the outlet heat insulating gasket b are each made of a heat-resistant insulating material to prevent heat transfer to other areas, playing a role in insulating the heat. And at the same time, the internal temperature of the outlet pipe 301 can be kept constant so as to prevent the ignited metal powder 5 from being extinguished when it encounters with the cool air. Thus, the problem of the extinguishment of the flame when the the flame is ejected by the cold firework device and encounters with the cool air is solved.

[0040] The purpose, the technical solutions and the

beneficial effects of the present disclosure are further described in detail by the above-mentioned specific embodiments. It should be understood that the above description is only specific examples of the invention as claimed in the appended claims 1-10.

Claims

1. A cold firework excitation device for a cold firework ejection apparatus,
wherein the cold firework excitation device comprises: a heating mechanism (1) for gradually heating metal powder (5) during conveyance of the metal powder, an ignition mechanism (2) for exciting and igniting the heated metal powder (5) by means of airflow, and an ejection mechanism (3) for ejecting the ignited metal powder (5) by the airflow from the ignition mechanism (2);
wherein an output end of the heating mechanism (1) is communicated with the ignition mechanism (2),
wherein an output end of the ignition mechanism (2) is communicated with the ejection mechanism (3);
wherein the airflow from the ignition mechanism (2) is output toward the ejection mechanism (3);
wherein the ejection mechanism (3) is provided with an ejection port (4); wherein the heating mechanism (1) comprises: a conveying passage (101) for conveying the metal powder (5); a material-urging screw (102) provided in the conveying passage (101) so as to continuously urge the metal powder (5) entering from a feeding inlet (104) along an inner wall surface of the conveying passage (101) toward the ignition mechanism (2); and a heating ring (103) that is closely fitted over an outer wall surface of the conveying passage (101) and configured to gradually heat the metal powder (5);
wherein by controlling a gap between the material-urging screw (102) and the conveying passage (101) and controlling the rotational speed of the material-urging screw (102), the uniformity and continuity of the metal powder (5) urged by the material-urging screw (102) can be controlled, thereby controlling the stability and continuity of the flame and thus solving the problem of unstability and discontinuity of the flame when being ejected by the cold firework ejection apparatus.

2. The cold firework excitation device for a cold firework ejection apparatus according to claim 1,
wherein the heating ring (103) is distributed in a direction from the feeding inlet (104) to the ignition mechanism (2).

3. The cold firework excitation device for a cold firework ejection apparatus according to claim 2,
wherein a heat preservation sleeve (7) for heat preservation and heat leakage prevention is sleeved outside of the heating ring (103); and
wherein at least one end of the conveying passage (101) is provided with a heat insulating gasket (8) for heat preservation and heat leakage prevention.

4. The cold firework excitation device for a cold firework ejection apparatus according to claim 1,
wherein the ignition mechanism (2) comprises: an ignition portion (201) for communicating with the output end of the heating mechanism (1); and a blower (202) for blowing air toward the ignition portion (201), and
wherein the heated metal powder (5) is ejected outward from an ejection port of the ejection mechanism (3) after being excited and ignited by means of the airflow provided by the blower (202).

5. The cold firework excitation device for a cold firework ejection apparatus according to claim 4,
wherein the blower (202) is a speed-adjustable blower to control an ejection height of the cold fireworks.

6. The cold firework excitation device for a cold firework ejection apparatus according to claim 4,
wherein the ejection mechanism (3) comprises an outlet pipe (301) that is communicated with an output end of the ignition portion (201); and
wherein the outlet pipe (301), the ignition portion (201) and the blower (202) are arranged in a same axis.

7. The cold firework excitation device for a cold firework ejection apparatus according to claim 6,
wherein the outlet pipe (301) and the ignition portion (201) are integrally formed as a unitary structure.

8. The cold firework excitation device for a cold firework ejection apparatus according to claim 2,
wherein the heating mechanism (1) is connected to a driving mechanism (9) for driving the material-urging screw (102) to rotate.

9. The cold firework excitation device for a cold firework ejection apparatus according to any one of claims 1 to 8,
wherein the heating mechanism (1), the ignition mechanism (2) and the ejection mechanism (3) are mounted onto a same supporting member (10);
wherein the ignition mechanism (2) and the ejection mechanism (3) are coaxially arranged, and
wherein the heating mechanism (1) is arranged in a direction perpendicular to axes of the ignition mechanism (2) and the ejection mechanism (3).

10. A cold firework ejection apparatus, comprising the cold firework excitation device according to any one of claims 1 to 9.

Patentansprüche

1. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung,
wobei die Kaltfeuerwerk-Erregungsvorrichtung aufweist: einen Heizmechanismus (1) zum graduellen Aufheizen von Metallpulver (5) während Förderung des Metallpulvers, einen Zündmechanismus (2) zum Erregen und Zünden des aufgeheizten Metallpulvers (5) mittels Luftstrom, und einen Ejektionsmechanismus (3) zum Ejizieren des gezündeten Metallpulvers (5) durch den Luftstrom von dem Zündmechanismus (2);
wobei ein Ausgabeende des Heizmechanismus (1) mit dem Zündmechanismus (2) in Verbindung steht,
wobei ein Ausgabeende des Zündmechanismus (2) mit dem Ejektionsmechanismus (3) in Verbindung steht;
wobei der Luftstrom von dem Zündmechanismus (2) zu dem Ejektionsmechanismus (3) hin ausgegeben wird;
wobei der Ejektionsmechanismus (3) mit einer Ejektionsöffnung (4) bereitgestellt ist;
wobei der Heizmechanismus (1) aufweist: einen Zuführdurchgang (101) zum Zuführen des Metallpulvers (5); eine Material fördernde Schraube (102), die in dem Zuführdurchgang (101) bereitgestellt ist, um das Metallpulver (5), das von einem Beschickungseinlass (104) eintritt, kontinuierlich entlang einer Innenwandoberfläche der Zuführvorrichtung (101) zu dem Zündmechanismus (2) hin zu fördern; und einen Heizring (103), der nahe über eine Außenwandoberfläche des Zuführdurchgangs (101) eingepasst und dazu ausgebildet ist, das Metallpulver (5) graduell aufzuheizen;
wobei durch Steuern einer Lücke zwischen der Material fördernden Schraube (102) und dem Zuführdurchgang (101) und Steuern der Drehgeschwindigkeit der Material fördernden Schraube (102) die Gleichmäßigkeit und Stetigkeit des von der Material fördernden Schraube (102) geförderten Metallpulvers (5) gesteuert werden kann, wodurch die Stabilität und Stetigkeit der Flamme gesteuert wird, und somit das Problem einer Instabilität und Unstetigkeit der Flamme gelöst wird, wenn sie von der Kaltfeuerwerk-Ejektionsvorrichtung ejiziert wird.

2. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung nach Anspruch 1,
wobei der Heizring (103) in Richtung von dem Beschickungseinlass (104) zu dem Zündmechanismus (2) verteilt ist.

3. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung nach Anspruch 2,
wobei eine Wärmeerhaltungshülse (7) zur Wärmeerhaltung und Verhinderung einer Wärmeleckage außenseitig des Heizrings (103) angebracht ist; und
wobei zumindest ein Ende des Zuführdurchgangs (101) mit einer Wärmeisolierdichtung (8) zur Wärmeerhaltung und Verhinderung einer Wärmeleckage bereitgestellt ist.

4. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung nach Anspruch 1,
wobei der Zündmechanismus (2) aufweist: einen Zündabschnitt (201) zum Kommunizieren mit dem Ausgabeende des Heizmechanismus (1); und ein Gebläse (202) zum Blasen von Luft zu dem Zündabschnitt (201) hin, und
wobei das aufgeheizte Metallpulver (5) aus einer Ejektionsöffnung des Ejektionsmechanismus (3) nach außen ejiziert wird, nachdem es mittels des Luftstroms, der von dem Gebläse (202) bereitgestellt ist, erregt und gezündet worden ist.

5. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung nach Anspruch 4,
wobei das Gebläse (202) ein geschwindigkeitseinstellbares Gebläse ist, um eine Ejektionshöhe des Kaltfeuerwerks zu steuern.

6. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung nach Anspruch 4,
wobei der Ejektionsmechanismus (3) ein Auslassrohr (301) aufweist, das mit einem Ausgabeende des Zündabschnitts (201) in Verbindung steht; und
wobei das Auslassrohr (301), der Zündabschnitt (201) und das Gebläse (202) in einer selben Achse angeordnet sind.

7. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung nach Anspruch 6,
wobei das Auslassrohr (301) und der Zündabschnitt (201) integral als einheitliche Struktur gebildet sind.

8. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung nach Anspruch 2,
wobei der Heizmechanismus (1) mit einem Antriebsmechanismus (9) zum in-Drehung-Antreiben der Material fördernden Schraube (102) verbunden ist.

9. Kaltfeuerwerk-Erregungsvorrichtung für eine Kaltfeuerwerk-Ejektionsvorrichtung nach irgendeinem der Ansprüche 1 bis 8,
wobei der Heizmechanismus (1), der Zündmechanismus (2) und der Ejektionsmechanismus (3) an einem selben Tragelement (10) montiert sind;
wobei der Zündmechanismus (2) und der Elektionsmechanismus (3) koaxial angeordnet sind, und
wobei der Heizmechanismus (1) in Richtung senkrecht zu Achsen des Zündmechanismus (2) und des Ejektionsmechanismus (3) angeordnet ist.

10. Kaltfeuerwerk-Ejektionsvorrichtung, mit der Kaltfeuerwerk-Erregungsvorrichtung nach irgendeinem der

Ansprüche 1 bis 9.

Revendications

1. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid,
dans lequel le dispositif d'excitation de feu d'artifice froid comprend : un mécanisme de chauffage (1) pour chauffer progressivement une poudre métallique (5) pendant le transport de la poudre métallique, un mécanisme d'allumage (2) pour exciter et allumer la poudre métallique chauffée (5) au moyen d'un flux d'air, et un mécanisme d'éjection (3) pour éjecter la poudre métallique allumée (5) par le flux d'air du mécanisme d'allumage (2) ;
dans lequel une extrémité de sortie du mécanisme de chauffage (1) est en communication avec le mécanisme d'allumage (2),
dans lequel une extrémité de sortie du mécanisme d'allumage (2) est en communication avec le mécanisme d'éjection (3) ;
dans lequel le flux d'air du mécanisme d'allumage (2) est délivré en sortie vers le mécanisme d'éjection (3) ;
dans lequel le mécanisme d'éjection (3) est pourvu d'un orifice d'éjection (4) ;
dans lequel le mécanisme de chauffage (1) comprend : un passage de transport (101) pour transporter la poudre métallique (5) ; une vis de poussée de matière (102) prévue dans le passage de transport (101) de manière à pousser en continu la poudre métallique (5) entrant par une entrée d'alimentation (104) le long d'une surface de paroi interne du passage de transport (101) vers le mécanisme d'allumage (2) ; et une bague chauffante (103) qui est ajustée étroitement sur une surface de paroi externe du passage de transport (101) et configurée pour chauffer progressivement la poudre métallique (5) ;
dans lequel en commandant un espace entre la vis de poussée de matière (102) et le passage de transport (101) et en commandant la vitesse de rotation de la vis de poussée de matière (102), l'uniformité et la continuité de la poudre métallique (5) poussée par la vis de poussée de matière (102) peuvent être commandées, commandant ainsi la stabilité et la continuité de la flamme et résolvant ainsi le problème d'instabilité et de discontinuité de la flamme lorsqu'elle est éjectée par l'appareil d'éjection de feu d'artifice froid.

2. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid selon la revendication 1,
dans lequel la bague chauffante (103) est distribuée dans une direction allant de l'entrée d'alimentation (104) au mécanisme d'allumage (2).

3. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid selon la revendication 2,
dans lequel un manchon de conservation de la chaleur (7) pour la conservation de la chaleur et la prévention des pertes de chaleur est emmanché à l'extérieur de la bague chauffante (103) ; et
dans lequel au moins une extrémité du passage de transport (101) est pourvue d'un joint d'isolation thermique (8) pour la conservation de la chaleur et la prévention des pertes de chaleur.

4. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid selon la revendication 1,
dans lequel le mécanisme d'allumage (2) comprend : une partie d'allumage (201) pour communiquer avec l'extrémité de sortie du mécanisme de chauffage (1) ; et un souffleur (202) pour souffler de l'air vers la partie d'allumage (201), et
dans lequel la poudre métallique chauffée (5) est éjectée vers l'extérieur à partir d'un orifice d'éjection du mécanisme d'éjection (3) après avoir été excitée et allumée au moyen du flux d'air fourni par le souffleur (202).

5. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid selon la revendication 4,
dans lequel le souffleur (202) est un souffleur à vitesse réglable pour commander une hauteur d'éjection des feux d'artifice froids.

6. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid selon la revendication 4,
dans lequel le mécanisme d'éjection (3) comprend un tuyau de sortie (301) qui est en communication avec une extrémité de sortie de la partie d'allumage (201) ; et
dans lequel le tuyau de sortie (301), la partie d'allumage (201) et le souffleur (202) sont agencés dans un même axe.

7. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid selon la revendication 6,
dans lequel le tuyau de sortie (301) et la partie d'allumage (201) sont formés d'un seul tenant comme une structure unitaire.

8. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid selon la revendication 2,
dans lequel le mécanisme de chauffage (1) est relié à un mécanisme d'entraînement (9) pour entraîner en rotation la vis de poussée de matière (102).

9. Dispositif d'excitation de feu d'artifice froid pour un appareil d'éjection de feu d'artifice froid selon l'une quelconque des revendications 1 à 8,
dans lequel le mécanisme de chauffage (1), le mécanisme d'allumage (2) et le mécanisme d'éjection (3) sont montés sur un même élément de support (10) ;
dans lequel le mécanisme d'allumage (2) et le mécanisme d'éjection (3) sont arrangés de manière coaxiale, et
dans lequel le mécanisme de chauffage (1) est agencé dans une direction perpendiculaire aux axes du mécanisme d'allumage (2) et du mécanisme d'éjection (3).

10. Appareil d'éjection de feu d'artifice froid, comprenant le dispositif d'excitation de feu d'artifice froid selon l'une quelconque des revendications 1 à 9.

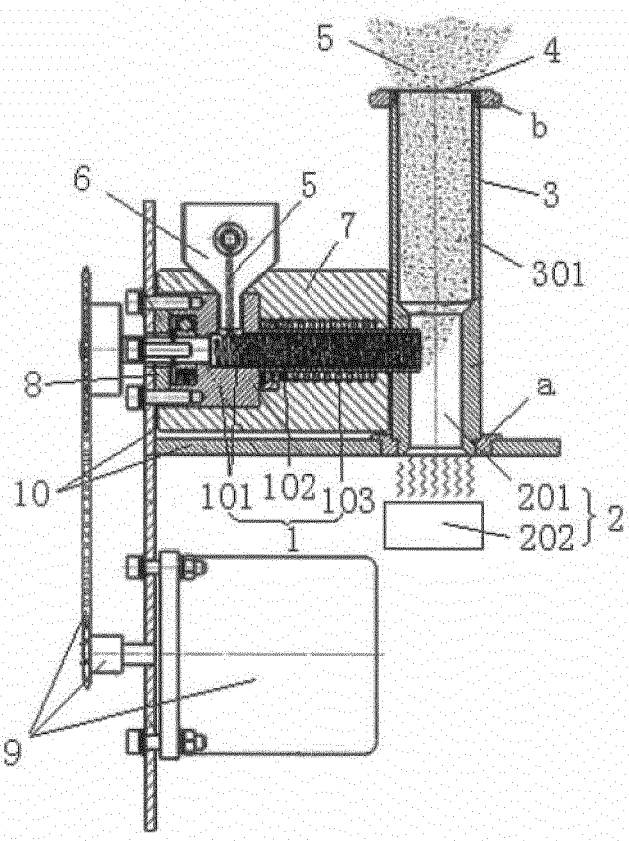

Fig. 1

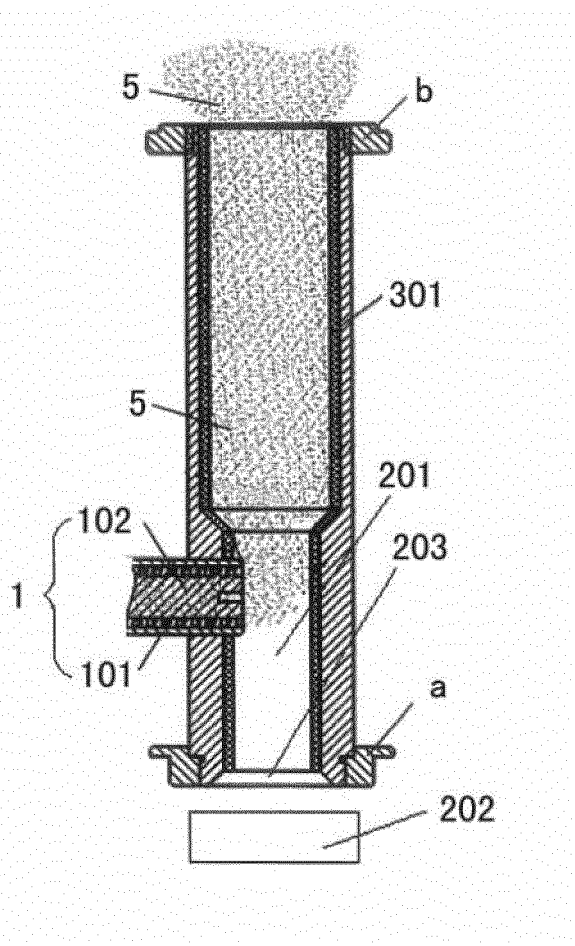

Fig. 2

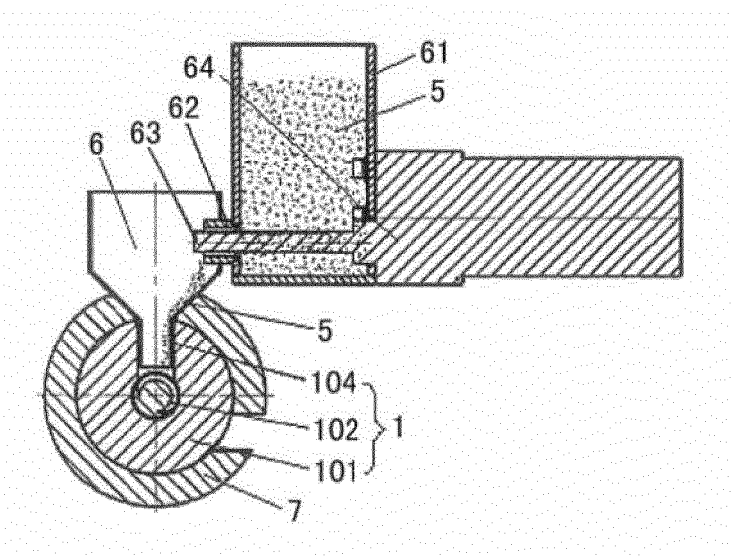

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN 204202494 U **[0004]**
- CN 203203474 U **[0005]**