Aug. 2, 1938. F. P. C. BENOIT 2,125,764

APPARATUS FOR PROJECTION OF MOLTEN PULVERIZED BODIES

Filed Oct. 19, 1935

Fig. 1

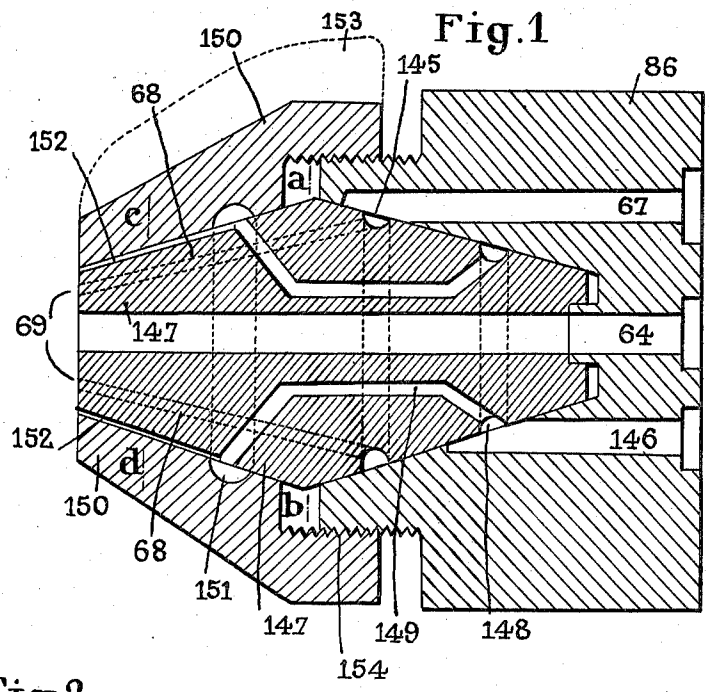


Fig. 2

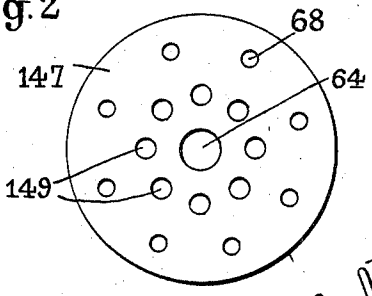


Fig. 3

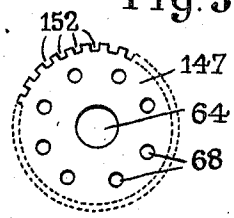
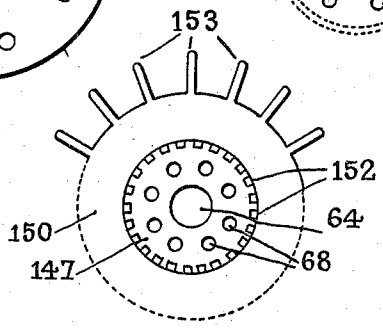


Fig. 4



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APPARATUS FOR PROJECTION OF MOLTEN PULVERIZED BODIES

Francois Philippe Charles Benoit, Paris, France

Application October 19, 1935, Serial No. 45,772
In France October 31, 1934

1 Claim. (Cl. 91—12.2)

The invention, which is an improvement in or modification of the apparatus for projecting molten pulverized bodies which forms the subject of Patent No. 1,998,217 as improved upon or modified by the invention forming the subject of Patent 2,072,845, is concerned with the cooling of the nozzle of the burner, in order to prevent it from reaching an excessive temperature after prolonged operation, and with means for effecting this cooling.

The burner disclosed particularly in Patent 2,072,845 gives a flame of very high temperature. As a result, the temperature of the burner itself may rise gradually to a value such that it is necessary to limit the duration of use of the burner in order to avoid upsetting of the flame and auto-ignition of the combustible mixture. These drawbacks are obviated by the present invention, which consists essentially in establishing in the burner itself or around the burner a particular cooling system which prevents the temperature of the said burner from rising excessively. This cooling may be obtained by bringing air or any other suitable fluid in flow into contact with the burner nozzle so as to abstract excessive heat from the metal and dissipate it outwardly.

In order to leave no doubt regarding the invention, I have hereinafter described below, but by way of example only, some forms of construction, with reference to the accompanying drawing, in which:

Fig. 1 is an axial section of a burner provided internally with passages for cooling air, and, if desired, provided externally with fins which increase the surface cooled by the surrounding air.

Fig. 2 is a transverse section on the line *a—b* of Fig. 1.

Fig. 3 is a transverse section on the line *c—d* of Fig. 1.

Fig. 4 is a front view of the burner tip.

As in the specifications of the said prior patents, there is shown in these figures, at 64, axially of the burner, the delivery passage for the current of air carrying in suspension the powders to be projected. The gaseous combustible mixture is delivered by passages 67, said mixture being led by way of the annular groove 145 to the passages 68 which open at 69 at the burner tip around the jet of air laden with powder.

An additional passage 146 is connected to a source of supply of compressed air; this air, which serves for the projection of the powder after it is fused in the heating flame, serves in the first place for cooling the burner, and, in particular the spool 147.

With this object in view, the air which is delivered by way of 146 is distributed by an annular groove 148 among passages 149 leading to the conical surface between the spool 147 and the cap 150. An annular groove 151, cut for example in the bore of the cap 150, distributes this air among passages 152 extending along generatrices of the conical exterior surface of the spool 147.

It will be seen that I thus obtain jets of compressed air issuing in the form of a ring around the flame and serving to propel the powder.

This air is heated during its flow along the passages 149, thus cooling the spool 147 in which these passages are formed.

Further, in flowing through the passages 152, the air cools both the spool 147 and the cap 150 which form the boundaries of the passages 152.

Independently of this arrangement for cooling the interior of the burner, its external cooling may be facilitated by any suitable means. For example, fins 153 may be provided on the cap 150 so as to increase the surface of contact with the surrounding air which absorbs the heat by convection. The section, profile and arrangement of these fins may be varied.

By way of example Fig. 4 shows radially disposed fins having a profile represented in dotted lines in Fig. 1. These fins may be formed in parallel planes so as to be adapted for example to natural air currents or currents set up by ventilation, having a determined orientation. Also, the cap 150 may be surrounded by an envelope so as to provide around it a jacket chamber in which may be circulated a suitable fluid, such as air, water, oil, etc., adapted to cool by convection the exterior surface of the cap 150. It suffices to connect the said chamber to a source of fresh fluid and to provide it with a conduit for withdrawal of the heated fluid. The circulation of the said fluid may be obtained by any suitable means and tubes for the delivery and discharge of the fluid may be fixed at any suitable points of the chamber. The chamber may also be provided internally with partitions adapted to control the circulation of the fluid.

The form of construction represented in Fig. 1 has in particular the advantage that it permits of obtaining, by means of a single screw joint 154, the absolute sealing of the passages for the supply of combustible mixture from the passages for air to be projected, without requiring packings of leather, fibre, asbestos, etc.

On the other hand, the spool 147 is very readily removable, thus permitting increase or reduction

of the calorific power of the heating flame, depending on the nature of the powder employed.

When employing the internal cooling arrangement by means of compressed air, as shown in Fig. 1, it is useful accordingly to modify the three-way cock disclosed in Patent 2,072,845. Four fluids are then to be admitted, since, in addition to the three fluids heretofore provided for, there is also the supply of compressed air for cooling the burner and for propelling the molten powder. The passage for the supply of this air may be opened or closed at the same time as the supply of air charged with powder is admitted or cut off, respectively the powder-laden air passing by way of the conduits 25a and 25 and the passage 100 of the cock 97. It suffices to form in the plug 99 of this cock an additional passage, parallel to the passage 100, and corresponding to these parallel passages or to the conduits 25a and 25. These arrangements, which are extremely simple, are not represented in the drawing.

It will be understood that, without departing from the principle of my invention, there may be made modifications to the above described embodiment which do not alter its spirit and any suitable materials may be utilized for the realization of the invention. Further, the forms represented may be varied subject to the condition of satisfying the conditions indicated and achieving the end in view. It is to be understood on the other hand that the various devices provided may be applied either separately or in combination.

For example, the form of the passages 68 and 149 or of the grooves 152 may be varied, notably depending on the method employed to form the same or depending on the direction it is desired to give to their termination at the tip of the burner.

What I claim is:

A burner for use in projecting molten material comprising at least one member having the following conduits and arrangement thereof, a central conduit for the discharge of an air stream holding in suspension particles of the material to be melted, a plurality of gas conduits for the discharge of a gaseous combustible mixture disposed around said central conduit and terminating at the burner tip in an annular series of outlet orifices surrounding the outlet orifice of the central conduit, and a plurality of air conduits through which air may be passed to cool said member and said gaseous combustible mixture, said air conduits throughout a part of their length being located closer to the central conduit than are the gas conduits and then crossing said gas conduits and terminating at the burner tip in outlet orifices which form an annular series surrounding the annular series of outlet orifices of the gas conduits.

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