No. 771,464. PATENTED OCT. 4, 1904.

A. C. CUNNINGHAM.

INJECTOR BURNER.

APPLICATION FILED SEPT. 24, 1902.

NO MODEL.

Fig. 1.

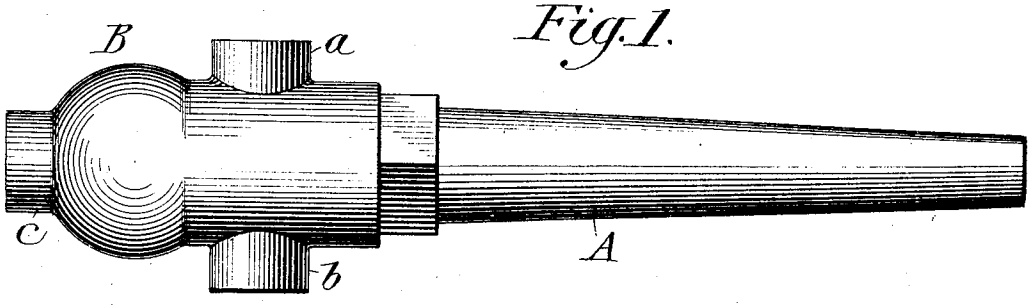


Fig. 2.

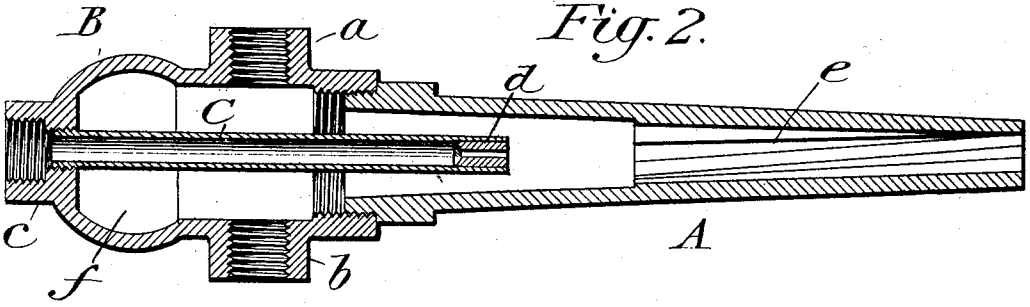
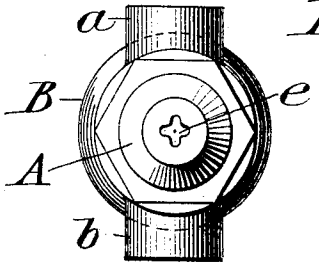


Fig. 3.



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No. 771,464. Patented October 4, 1904.

UNITED STATES PATENT OFFICE.

ANDREW C. CUNNINGHAM, OF NEW ORLEANS, LOUISIANA.

INJECTOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 771,464, dated October 4, 1904.

Application filed September 24, 1902. Serial No. 124,654. (No model.)

To all whom it may concern:

Be it known that I, ANDREW C. CUNNINGHAM, a resident of the city of New Orleans, parish of Orleans, State of Louisiana, have invented certain new and useful Improvements in Injector-Burners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in injector-burners, and particularly to that type wherein the issuing jet consists of oil-vapor and an aeriform fluid, preferably steam and air intimately commingled.

The object of my invention is to provide a burner of this general type of high efficiency and of great simplicity of structure, the burner being devoid of movable or adjustable parts and consisting of the minimum number of elements assembled together in a comparatively small compass, and of such a character as to withstand without warping the great heat to which devices of this kind are necessarily subjected in use.

Further features of advantage consist in combining the burner with practically straight continuous passages as free from obstruction and direct interference with the moving current of fluid as possible, yet with due provision for insuring the desired commingling of the constituent elements thereof, so that the continued use of an oil containing grit or sand is permissible without danger of clogging or stopping the burner-passages.

In the accompanying drawings, Figure 1 represents a side elevation of an injector-burner embodying my invention. Fig. 2 represents a central section thereof, and Fig. 3 represents a front elevation.

Similar letters of reference indicate similar parts throughout the several views.

Referring to the drawings, it will be noted that in the form shown the burner consists of but three elements—to wit, the mixing and discharge nozzle A, the breech or pipe-coupling member B, and the oil-inlet pipe C, these elements being adapted to be readily assembled by means of screw-thread joints, as shown. The breech B is provided with screw-threaded nipples *a b* for the reception of correspondingly-screw-threaded steam and air supply pipes, respectively, and is also provided with a screw-threaded nipple *c*, adapted to communicate with the oil-supply pipe for the admission of oil into the oil-inlet pipe C. The oil-inlet pipe C is preferably of a twisted configuration, as indicated in Fig. 2, except at its forward end, where it is provided with a plug *d*, having a passage-way of contracted diameter. At a point immediately adjacent to the outlet end of the pipe C the nozzle A is rifled after the manner of a piece of ordnance, the several rifle-grooves making substantially a quarter-turn from the beginning to the end thereof, as indicated in Figs. 2 and 3. In addition to this the rifled bore A tapers longitudinally toward its free end, so as to exert a slight back pressure within the burner. I find that the rifling of the nozzle, together with the slight back pressure referred to, very considerably increases the range of projection of the flame from the burner, and I also find that the steadiness, uniformity, and noiselessness of the issuing jet are largely enhanced by providing within the breech-piece B an equalizing-chamber *f* of relatively large dimensions in the rear of the air and steam admission ports. By restricting the riflings to substantially a quarter-turn I secure the desired rotary movement essential to the proper subdivision of the oil and its commingling with the accompanying steam or air without unduly interfering with the velocity of the current or unduly obstructing its substantially direct passage through the nozzle. The mixture of aeriform fluid and oil, in fact, constitutes substantially a projectile, which driven through the rifled nozzle has small cohesive force, the particles of oil being dissipated by the centrifugal action, this centrifugal action being greatest at the end of the nozzle, at which point the oil will reach its finest state of subdivision. Combustion of the issuing jet does not take place, however, immediately upon its issuance from the end of the nozzle. On the contrary, the issuing jet is of substan-

tially cylindrical contour, although having a rotary motion, and it preserves this contour for a distance of more than a foot from the end of the nozzle, whereupon it begins to diverge in the form of a whirling cone. This characteristic of the invention is, so far as I am aware, broadly new and is of particular value for the reason that the active combustion of the jet does not begin until the point of divergence is reached, and therefore the burner (and particularly the nozzle) is protected against the intense heat, which would tend to warp or even melt the parts if the combustion extended back to substantially the end of the nozzle. In actual tests made with this burner I also find that even with considerable variation in pressure there is no dripping from the end of the nozzle. The capacity of the burner to permit variations in pressure without dripping adapts it to a variety of uses requiring varying ranges of projection of the flame—as, for instance, in brick-making, where it is necessary at different periods of the operation to change the range of projection of the flame, or in the firing of steam-boilers having heating-surfaces extending over a large area.

It will of course be understood that the projecting fluid (steam or air, or both) is not relied upon to supply the oxygen necessary for the combustion of the oil, although contributing thereto. The combustion is supported, as is usual, by air which enters the furnace in the ordinary manner through controlling-dampers.

By independently varying the actual and relative amounts and pressures of the oil and the steam or air by suitable valves on the supply-pipes a great variety in range, intensity, and kind of flame may be produced without interrupting the continuous action of the burner, these capabilities being particularly valuable in the application of the burner to steam-boilers and to metallurgical operations, as well as in various classes of manufacturing processes—such as burning brick, pottery, porcelain, and the like—and in the annealing and tempering of various metals.

Having thus described my invention, what I claim is—

An injector-burner, having an expanded breech, forming a pressure-equalizing chamber, said breech being provided, in advance of said chamber, with oppositely-disposed steam and air ports, a tapering nozzle having rifle-grooves, and an oil-pipe whose outlet-opening is intermediate of said steam and air ports and said rifle-grooves, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

ANDREW C. CUNNINGHAM.

Witnesses:

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