

O. WESTPHAL.
INJECTOR.

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Inventor,
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attys.

UNITED STATES PATENT OFFICE.

OTTO WESTPHAL, OF HAMBURG, GERMANY, ASSIGNOR TO WEBER & WESTPHAL, OF SAME PLACE.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 414,098, dated October 29, 1889.

Application filed May 1, 1889. Serial No. 309,175. (Model.)

To all whom it may concern:

Be it known that I, OTTO WESTPHAL, a subject of the Emperor of Germany, residing at Hamburg, in the German Empire, have invented certain new and useful Improvements in Injectors; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in that class of injectors which are commonly known under the name of "restarting and exhaust-steam injectors;" and the object of my invention is to provide means for securing the instantaneous restarting of the injector as soon as steam and fluid are permitted to enter the receiving-cone. I attain this object by the peculiar construction and arrangement of parts forming my improved injector illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of an injector provided with my improvements; Fig. 2, a top view of an improved cone—the essential feature of this invention; Fig. 3, a vertical section of the slightly-modified inner parts of my injector, and Fig. 4 a top view of the heretobelonging principal cone.

Similar letters refer to similar parts throughout the several views.

My injector consists of the casing A, with the branch A' for the water-inlet, the branch A², forming the overflow and being provided with a check-valve, the cone c for the entrance of steam, the lifting-cone a, and the combining-cone D, connected to the discharging-cone g.

In contrast with the injectors of the older type mentioned, my injector is provided with a stationary invariable lifting-cone a, separate from the intermediate combining-cone D, which consists either of a stationary part d and a yielding part d' or of two or more yielding parts d' d², serving to enlarge or contract the sectional area of the steam and water passage automatically. This intermediate combining-cone is preferably connected with the discharge or delivery cone g, and the

yielding part or parts of the former are hinged thereto in such a manner as to form a flap or flaps opening toward the lifting-cone a, and the hinge or hinges f f' of such flap or flaps are so arranged that the current or flow of fluid forced by the steam through the lifting-cone a when touching the inner surface of the said flap or flaps d' d² in the direction of the arrows will act upon a lever, the fulcrum of which is the hinge f or f' of the flap or flaps. These flaps, when closed, entirely surround the overflow h, which is in this state out of connection with the casing A of the injector. In consequence of this arrangement, the flap or flaps of the intermediate combining-cone D will automatically and instantaneously fold together under the influence of the mixture of steam and fluid striking against the inner surface of the oscillating section d', and thereby the jet at this moment will be established without fail.

In contradistinction to that class of injectors, as shown, e. g., in the United States Letters Patent No. 245,354, wherein the closing of the flap and the contraction of the water and steam passage of the combining-cone are caused only when the jet is entirely established at the overflow between the combining and the discharging cone and after the jet has obtained its maximum velocity, according to my present invention the mixture of steam and water, when entering into the cone D, will at once and directly cause the movable section or sections d' d² of the same to perfectly close before the jet is established. In the older construction of this class of injectors the oscillating section of the cone is maintained closed only by the sucking action of the jet, so that in case of a diminution of the pressure in the casing of the injector and of a higher pressure within the cone the oscillating flap will open, and thereby the action of the injector will cease. This will always occur if the overflow branch A² is provided with an air-valve, and therefore it has become customary to cut a groove into the seat of the air-valve in order to allow a certain amount of air to enter into the casing of the injector, thereby obviating the formation of a vacuum around the two-part combining-cone when the injector is in action. However, this rem-

edy is accompanied by the disadvantage that on feeding steam-boilers an enormous quantity of air is discharged with the water into the boiler, and therefore such injectors 5 could not be successfully employed with condensing-engines. All these disadvantages are entirely overcome by my present invention, as on account of the lever action, depending upon the particular arrangement of 10 the movable parts of the combining-cone, the latter is apt to close, and consequently to instantaneously restart the injector at the very moment the steam and water enter into this cone without prejudice of pressure surrounding the cone in the casing of the injector. 15 For this reason my injector may be provided with an absolutely air-tight check-valve at the overflow branch A² without altering the exact working of the injector. In consequence thereof my injector will feed water 20 of much higher temperature than that to be employed in connection with the aforesaid mentioned older injectors, which, by reason of their imperfect condensation of steam, will 25 not permit the supply of water of more than 15° of Celsius.

The principal feature of my invention consists in pivoting the section or sections of the combining-cone at their lower ends to the upper 30 end of the discharging-cone. By means

thereof the movement of such part or parts is rendered certain, especially in the starting of the injector. By extending the ends of said part or parts up to the lifting-cone they greatly aid in the accomplishment of the desired results. 35

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, what I desire to secure by Letters 40 Patent is—

1. As an improvement in steam-injectors, the combination, with the lifting and discharging cones, of the combining-cone having a pivoted section secured at its lower end 45 to said discharging-cone and extending to said lifting-cone, substantially as set forth.

2. As an improvement in steam-injectors, the combination, with the lifting and discharging cones, of the sectional combining- 50 cone having a hinged part or parts secured at their lower ends to the upper end of said discharge-cone, substantially as set forth.

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

OTTO WESTPHAL.

Witnesses:

ALEXANDER SPECHT,
G. MÉGUIN, Jr.