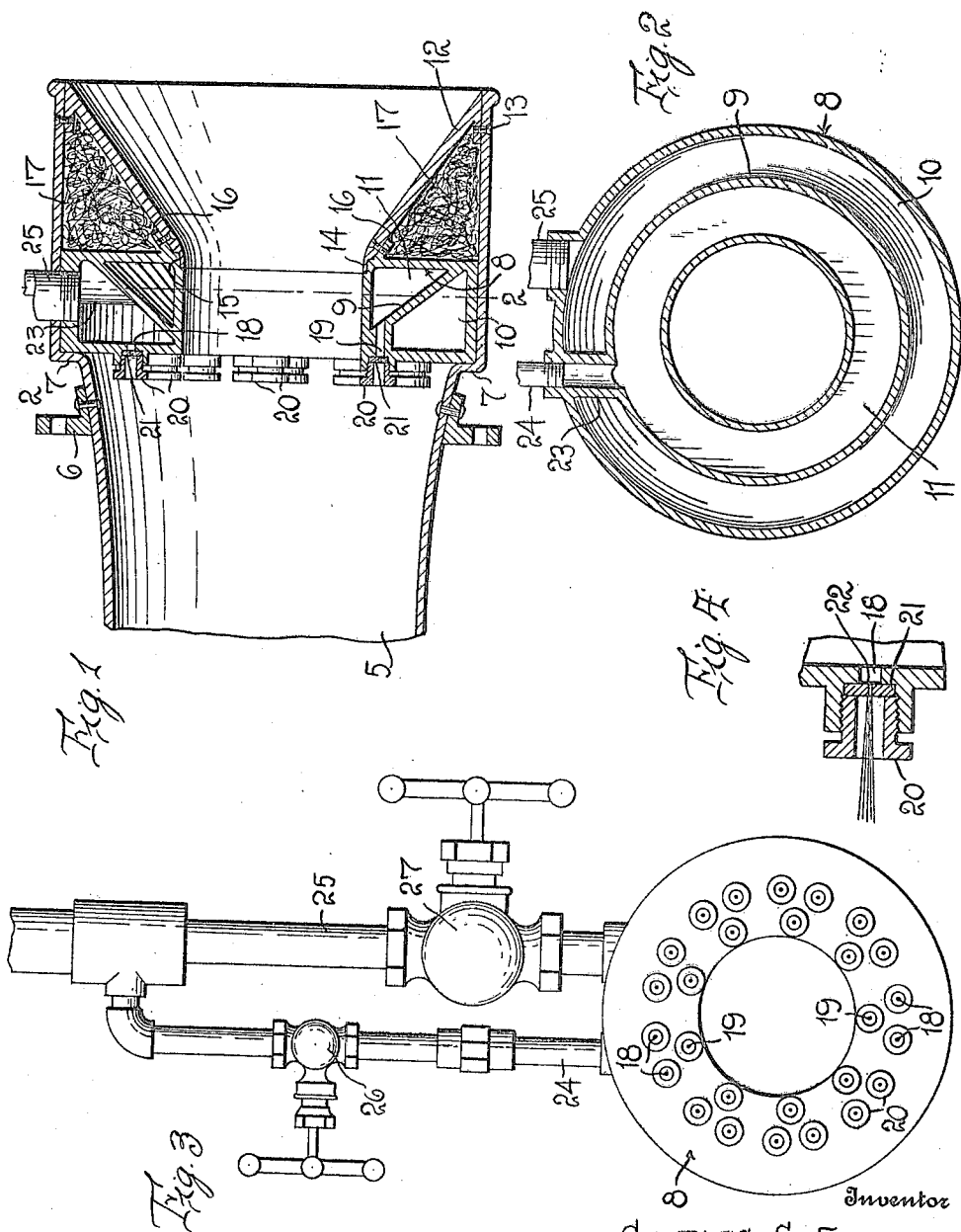


C. S. FARRER.
 STEAM BLOWER.
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Inventor
 CHARLES S. FARRER

By *Watson E. Coleman*
 Attorney

UNITED STATES PATENT OFFICE.

CHARLES S. FARRER, OF DUNMORE, PENNSYLVANIA.

STEAM-BLOWER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES S. FARRER, a citizen of the United States, residing at Dunmore, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Blowers, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to steam blowers for creating a forced draft to the fuel bed of a boiler furnace, and has for its primary object to provide certain improvements in the blower shown and described in Patent No. 631,007, issued to me August 15, 1899, whereby the efficiency of the blower in practical operation is increased to a marked degree.

It is one of the more particular objects of the present invention to provide a blower having a plurality of groups of steam jet orifices, and means for independently supplying steam under full pressure to certain of the jet orifices in each of said groups, whereby the volume of air supplied to the fuel bed may be varied or regulated as differing conditions thereof may require.

As one practical means for accomplishing the above stated purpose, I provide what will be hereinafter termed a "steam ring" mounted in the air intake nozzle, said ring being provided with two separate and distinct annular steam receiving chambers of different capacity, the inner wall of the steam ring having jet orifices arranged in spaced groups, certain of said orifices communicating with the larger steam chamber and the remaining orifices with the smaller chamber, and valved supply pipes for admitting live steam to the respective chambers in volumes corresponding with the capacity of said chambers.

The invention also has for a secondary object to provide suitable nipples for the jet orifices, and means determining the size of the steam jet and directing the same through the nipple but preventing contact of the steam therewith, and thus eliminating wear upon the wall of the nipple.

With the above and other objects in view, my invention consists in the novel features of construction, combination and arrangement of parts to be hereinafter more fully

described, claimed and illustrated in the accompanying drawing, in which,

Figure 1 is a longitudinal sectional view through the air intake nozzle, showing my improved steam blower applied thereto;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a detail elevation of the steam ring removed from the nozzle; and

Fig. 4 is an enlarged detail section through one of the jet nipples.

Referring in detail to the drawing, 5 designates the nozzle which is provided adjacent to one of its ends with an attaching flange 6, whereby it may be suitably secured in position. The smaller end portion of said nozzle projects through the furnace wall in contiguous relation to the grate. At the outer or outlet end of the nozzle, the same is diametrically enlarged, whereby a shoulder 7 is formed therein.

The steam ring, generally indicated by the numeral 8, consists of a single annular metal casting. This ring is hollow and is divided by an obliquely disposed, circular wall 9, whereby the internal annular chambers 10 and 11 respectively, are formed, the chamber 10 being of appreciably greater cross-sectional area than the chamber 11. This steam ring is fitted within the enlarged outer end of the nozzle 5 and against the shoulder 7. A frusto-conical annular plate 12 is positioned within the outer end of the nozzle 5 and has a laterally projecting flange formed upon its larger end which is fixed to the wall of the nozzle, as indicated at 13. The inner smaller end of the plate 12 is provided with a reduced, longitudinally projecting flange 14 which is seated within an annular recess 15 formed in the inner wall of the steam ring 8. At suitably spaced points, lugs 16 are formed upon the outer side wall of the steam ring, to which the inner end of the annular plate 12 is securely riveted, as shown. The space between this ring, the wall of the nozzle 5 and the steam ring 8, is preferably tightly packed with asbestos or other non-conducting material indicated at 17, so as to prevent the direct contact of air in its transmission with the side wall of the steam ring, and in this manner eliminate loss due to condensation which would take place if

the relatively cool inflowing air came into contact with the outer wall of the steam ring. The plate 12 constitutes the directing wall of the throat or mouth of the intake nozzle and constitutes, in effect, a continuation of the inner annular wall of the steam ring. Thus, no obstruction will be offered by the steam ring to the inflow of the air through the nozzle.

10 In the inner side wall of the steam ring 8, a plurality of groups of jet orifices are formed. Preferably, I provide nine such groups with three orifices in each group. Two of said orifices, indicated by the numeral 18, communicate with the larger steam receiving chamber 10, while the other or single orifice 19 in each group communicates with the smaller steam receiving chamber 11. For each of the jet orifices, I provide a removable threaded nipple 20 which is threaded in a boss surrounding the orifice, and has a bore of somewhat greater diameter than the orifice. Between this nipple and the orifice in the wall of the steam ring, a hardened fiber disk 21 is interposed. This disk may be permanently fixed to the end of the nipple or may be a separate part and clamped or held in place by the nipple. The disk 21 has an opening 22 centrally formed therein which determines the size of the steam jet delivered through the nipple 20. It is to be particularly noted that the bore of the nipple is relatively large so that the steam delivered through the opening in the disk 21 under high pressure will not contact with the wall of the nipple, and consequently there will be no wear upon the same. Attention is also directed to the fact that the jet orifices 19 communicating with the smaller steam chamber 11 are disposed inwardly of the remaining jet orifices 18 and nearer to the longitudinal central line of the nozzle.

The obliquely inclined wall 9 of the steam ring is integrally connected to the outer annular wall of said ring, as shown at 23, such connection being longitudinally bored to afford a passage communicating with the steam chamber 11 and opening on the periphery of the steam ring. A supply pipe 24 is threaded into the outer end of said passage and is suitably connected to a second supply pipe 25 extending from the steam boiler, said latter pipe being of relatively large diameter and having threaded connection with the outer wall of the steam ring to supply steam to the larger chamber 10 thereof. These pipes are provided with valves 26 and 27 respectively, whereby the supply of steam to the respective chambers may be controlled.

From the foregoing description, it is believed that the operation of my improved steam blower will be clearly and fully understood. When both of the valves 26 and

27 are opened and live steam is admitted to the chambers 10 and 11, said steam is delivered under very high pressure in the form of a multiplicity of jets into the air nozzle, and the air is drawn inwardly with the steam and forced under pressure through the fuel bed. Such a forced draft under full power is desirable when the fuel bed is full of clinkers or is very deep. Normally, the supply of steam to the chamber 11 is cut off by closing the valve 26 so that the steam will issue from only two jets 18 in each group which communicate with the chamber 10. This is the maximum capacity of the blower shown in my original patent above referred to. It will thus be seen that, in the present invention, I provide nine additional steam jets and a separate and independent means for supplying the steam to these jets under precisely the same pressure and in the same volume as the steam is supplied to the other eighteen jets. If the operator desires to reduce the draft, he may close the valve 27, thus cutting off the supply of steam to the chamber 10, and upon opening the valve 26 the steam is delivered only from the nine jets constituting the inner circular series. In such case, though there is a less volume of steam passing through the nozzle, as the jets 19 are located nearer to the axial center of the nozzle, the air in the desired volume will be supplied to the fuel bed. In my prior device, in order to obtain this reduction in the draft, it was necessary to reduce the steam pressure to all of the jets, whereas, in the present instance, the jets are so grouped and arranged that the steam supplied to a majority of the jets may be entirely cut off while the steam is delivered under full pressure from the remaining jets. It will thus be appreciated that from the standpoint both of economy and efficiency in operation, my improved blower is far superior to the original device.

The construction of the steam ring 8 being quite simple, will not increase to any material extent the manufacturing cost of the original invention. In the illustrated embodiment of the present improvements, I have disclosed a particular mounting and arrangement of the steam ring within the air nozzle, but it is, of course manifest that such mounting and arrangement is not indispensable to the successful operation of the device. It is, therefore, to be clearly understood that my invention is susceptible of considerable modification in this respect and that the several detail parts thereof may also be greatly varied as to form, proportion and arrangement, and I, therefore, reserve the privilege of adopting all such legitimate modifications as may be fairly embodied within the spirit and scope of the invention as claimed.

Having thus fully described my invention, what I desire to claim and secure by Letters Patent is:—

1. In a steam blower, the combination of
5 a nozzle, a one-piece steam ring within said nozzle having means for delivering steam longitudinally through the nozzle in two series of jets of different volume, the delivery jets being located in the same plane trans-
10 versely of the ring, and means for independently controlling the supply of steam to said series of jets.

2. In a steam blower, the combination of
15 a nozzle, a steam ring within said nozzle having two series of delivery jets, the delivery ends of said jets being located in the same transverse plane with respect to the nozzle, and means for independently controlling the supply of steam to said series of jets.

3. In a steam blower, the combination of
20 a nozzle, a steam ring within said nozzle having two circular series of delivery jets, there being a greater number of jets in one series than in the other, and means for independently controlling the supply of steam
25 to said series of jets.

4. In a steam blower, the combination of
30 a nozzle, a steam ring within said nozzle having two circular series of delivery jets, there being a greater number of jets in one series than in the other, the series having the lesser number of jets being located nearer the longitudinal central line of the nozzle than the jets in the other series, and
35 means for independently controlling the supply of steam to said series of jets.

5. In a steam blower, the combination of a
40 nozzle, a steam ring within said nozzle having spaced groups of delivery jets, one jet in each group being located nearer the longitudinal center line of the nozzle than the remaining jets, and means for independently controlling the supply of steam to the said
45 differently located jets in each series, whereby the steam may be delivered in varying volumes under maximum pressure through the nozzle.

6. In a steam blower, the combination of
50 a nozzle, a steam ring in said nozzle having separate steam receiving chambers disposed in the same plane diametrically of the ring, a series of delivery jets communicating with one of said chambers and a second series of delivery jets communicating with the
55 other chamber, and means for independently controlling the supply of steam to said chambers.

7. In a steam blower, the combination of a
60 nozzle, a steam ring in said nozzle having separate steam receiving chambers and provided with spaced groups of delivery jets, certain of the jets in each group communicating with one of the chambers and the remaining jets communicating with the other
65 chamber, the two series of jets being differ-

entially located with respect to the longitudinal center line of the nozzle, and means for independently controlling the supply of steam to said chambers.

8. In a steam blower, the combination of
70 a nozzle, a steam ring in said nozzle having separate steam receiving chambers, one of said chambers being of greater capacity than the other, two series of delivery jets, there being a greater number of jets in one
75 series than in the other, the series of jets having the greater number communicating with the larger of the steam chambers and the other series of jets communicating with the smaller steam chamber, and means for
80 supplying steam to the respective chambers in proportionate volume and under equal pressure.

9. In a steam blower, the combination of
85 a nozzle, a steam ring in said nozzle having separate steam receiving chambers, one of said chambers being of greater capacity than the other, two series of delivery jets, there being a greater number of jets in one
90 series than in the other, the series of jets having the greater number communicating with the larger of the steam chambers and the other series of jets communicating with the smaller steam chamber, the latter series
95 of jets being located nearer the longitudinal center line of the nozzle than the other series, and means for supplying steam to the respective chambers in proportionate volume and under equal pressure.

10. In a steam blower, the combination of
100 a nozzle, a steam ring in said nozzle having separate steam receiving chambers, one of which is of greater capacity than the other, delivery jets arranged in a circular series of
105 groups, a plurality of jets in each group communicating with the larger of the steam chambers and a single jet of each group communicating with the other of the steam chambers, and means for supplying steam
110 to the respective chambers in proportionate volume and under equal pressure.

11. In a steam blower, the combination of
115 a nozzle, a steam ring in said nozzle having separate steam receiving chambers, one of which is of greater capacity than the other, delivery jets arranged in a circular series of
120 groups, a plurality of jets in each group communicating with the larger of the steam chambers and a single jet of each group communicating with the other of the steam chambers, said latter jets being located
125 nearer the longitudinal center line of the nozzle than the other jets in each group, and means for supplying steam to the respective chambers in proportionate volume and under equal pressure.

12. In a steam blower, the combination of
130 a nozzle, a one-piece steam ring within said nozzle having separate steam receiving chambers of different capacity, a delivery

means communicating with each of said chambers to deliver steam through the nozzle from the larger chamber in greater volume than from the smaller chamber, and means for supplying steam to the respective chambers in proportionate volume and under equal pressure.

13. In a steam blower, the combination of a nozzle, a hollow steam ring in said nozzle having a division wall dividing the interior of the ring into separate steam receiving chambers, a circular series of delivery jets communicating with each of the chambers, and means for independently controlling the supply of steam to the respective chambers.

14. In a steam blower, the combination of a nozzle, a hollow steam ring in said nozzle having an obliquely inclined division wall dividing the interior of the ring into two annular chambers of different capacity, a circular series of steam jets communicating with each of said chambers, there being a greater number of jets in the series communicating with the larger chamber than in the series communicating with the smaller chamber, said latter series of jets being located nearer the longitudinal center line of the nozzle than the other series, and means for supplying steam under equal pressure to the respective chambers.

15. A steam blower ring having separate steam receiving chambers and delivery jets communicating with each of said chambers, the discharge ends of all of said jets being equidistantly spaced from the same face of

the ring, and means for independently controlling the supply of steam to said chambers.

16. A steam blower ring consisting of a single, hollow, annular body, two series of delivery jets projecting from one wall of said body and having their discharge ends disposed in the same plane transversely of the ring, and means to independently control the supply of steam to the respective series of jets.

17. A steam blower ring consisting of a single, hollow body having separate non-communicating chambers of different capacity, and a series of delivery jets communicating with each of said chambers and having their discharge ends disposed in the same plane transversely of the ring.

18. A steam blower ring consisting of a single, hollow, annular body having an internal division wall dividing said body into non-communicating chambers of different capacity, a series of steam delivery jets communicating with each of said chambers and having their discharge ends equidistantly spaced from the same face of the ring, and means to independently control the supply of steam to the ring chambers.

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

CHARLES S. FARRER.

Witnesses:

JAS. DONALD BROWN,
LESTER DAVIS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."