

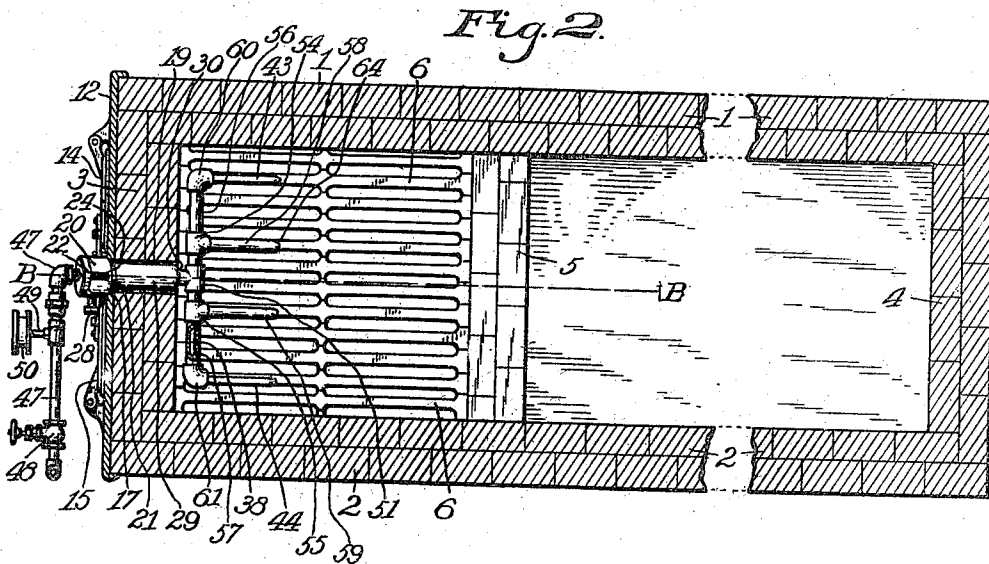
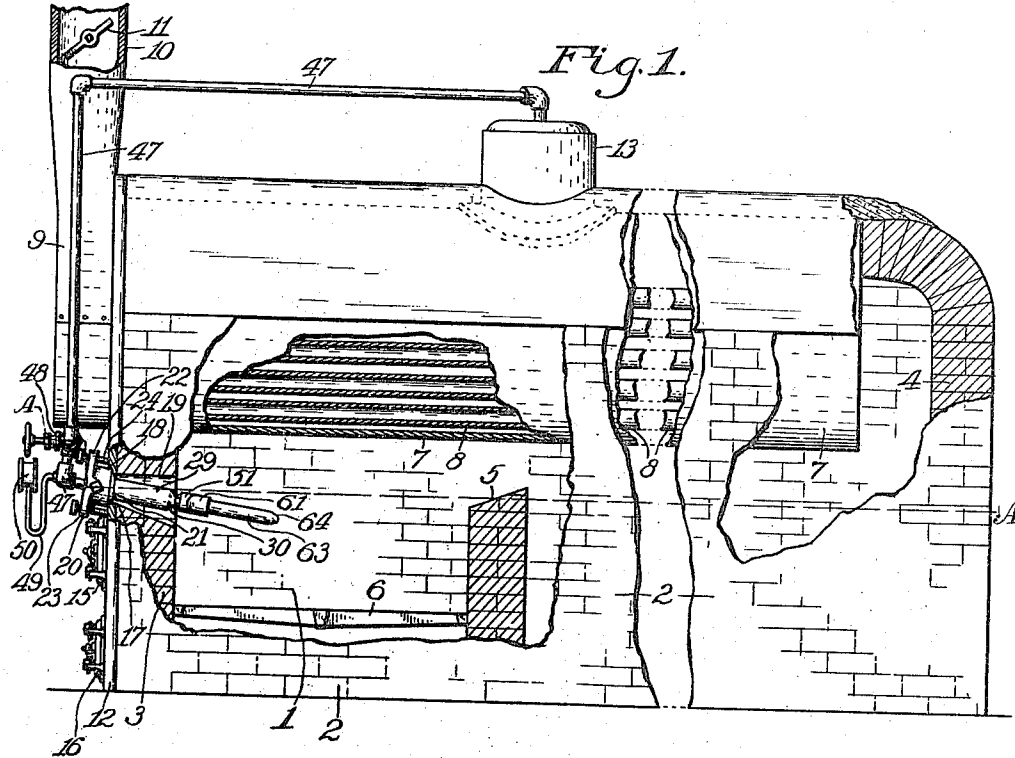
A. E. WILSON.
SMOKE CONSUMER.

APPLICATION FILED OCT. 30, 1911.

Patented Apr. 29, 1913.

2 SHEETS-SHEET 1.

1,060,051.



WITNESSES:

J. H. Gardner.
M. L. Wilhelm.

INVENTOR:

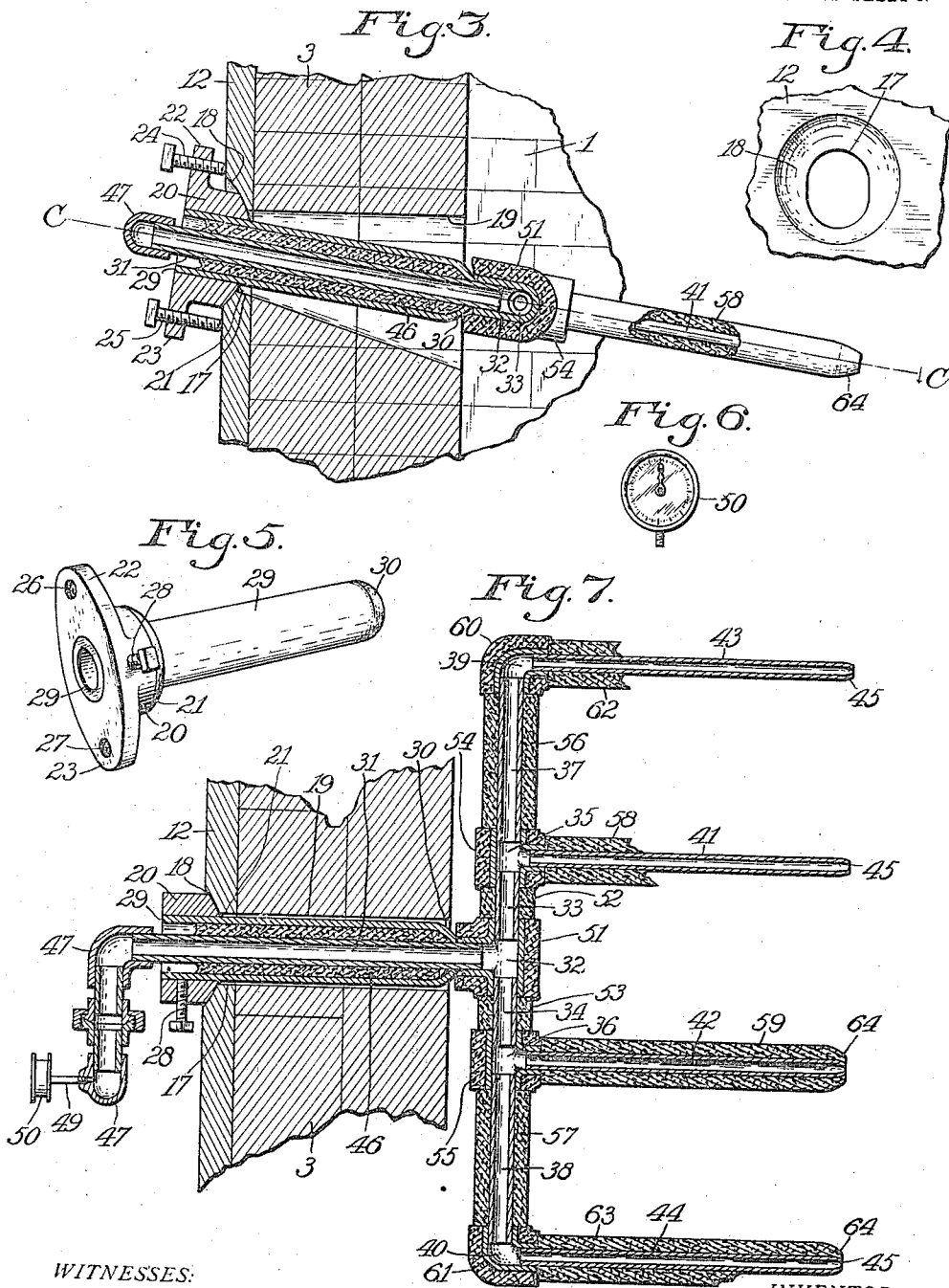
Almond C. Wilson,
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UNITED STATES PATENT OFFICE.

ALMOND E. WILSON, OF INDIANAPOLIS, INDIANA.

SMOKE-CONSUMER.

1,060,051.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed October 30, 1911. Serial No. 657,534.

To all whom it may concern:

Be it known that I, ALMOND E. WILSON, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Smoke-Consumer, of which the following is a specification, reference being had to the accompanying drawings and to the letters and figures of reference marked thereon.

This invention relates generally to the construction and equipment of steam boiler furnaces, the invention having reference more particularly to such as is adapted to eliminate the smoke evil and also to effect economy in the use of fuel.

The object of the invention primarily is to provide an improved smoke consumer that will be of such construction that it may be simply and cheaply produced, not liable to derangement in operation and which will be durable and economical in use; a specific object being to provide a smoke consumer of such construction that will permit of the introduction into the furnace of the desired gaseous fluid requisite for perfect combustion, without admitting atmospheric air in natural or cold condition.

A still further object is to provide improved smoke consuming apparatus whereby the desired results may be attained with the minimum velocity of draft possible, in order to prevent the heat from being drawn or forced up the chimney and wasted.

With the above mentioned and minor objects in view, the invention consists in a smoke consumer comprising a plurality of jet pipes connected to a header and arranged in a furnace at the front wall, and extending downwardly toward the bridge wall, the pipes being of considerable length to enable the jets of steam issuing therefrom to produce partial vacuum at the front wall and immediately above the fire, to receive the unconsumed smoke from fresh coal so as to prevent its escape and insure that it shall be consumed and aid in the generation of heat, the header being connected by means of a supply pipe with the steam space of a boiler.

The invention consists also in the parts and combinations and arrangements of parts as hereinafter particularly described and pointed out in the appended claims.

Referring to the drawings, Figure 1 is a side elevation of a steam boiler and furnace,

partially broken away, to which the invention is applied; Fig. 2, a horizontal section of the furnace on the line A A in Fig. 1; Fig. 3, a fragmentary vertical section on the line B B in Fig. 2; Fig. 4, a fragmentary elevation of the boiler front; Fig. 5, a perspective view of one of the parts of the apparatus; Fig. 6, a front elevation of a common form of pressure gage preferably employed in connection with the apparatus; and Fig. 7, a horizontal section on the plane of the line C C in Fig. 3.

Similar reference characters in the different figures of the drawings indicate like parts or elements herein referred to and described.

The furnace and the boiler may be variously constructed as will be understood, and as illustrating the invention a common type is shown comprising two side walls 1 and 2, a front wall 3, a rear wall 4, a bridge wall 5, grates 6 extending from the front wall to the bridge wall and from one to the opposite one of the side walls, a boiler 7 of the type that has draft tubes 8 therein, the boiler being provided with a smoke box 9 to which a chimney 10 provided with a damper 11 is connected, the boiler and furnace having an iron front 12, the boiler having a steam dome 13, and the furnace doors 14 and 15 and ash pit doors 16 are hung on the front 12.

In practically carrying out the objects of the invention an aperture 17 is cut or otherwise formed in the metallic front 12 and a ball-socket 18 is formed around the aperture. An aperture 19 is formed in the front wall 3 so as to be a continuation of the aperture 17 and it is larger vertically at its inner end than at its outer end. An adjusting head 20 is provided which has a ball joint face 21 at one side adapted to be seated in the ball-socket 18 and form a substantially air-tight joint therewith for excluding atmospheric air from the aperture 19, the head having two ears 22 and 23 thereon provided with adjusting screws 24 and 25 respectively, the ears having screw-threaded holes 26 and 27 therein respectively to receive the screws which normally extend into contact with the outer face of the front 12 adjacently to opposite sides of the ball-socket 18. The head is provided with a set-screw 28 which secures one end of a tubular holder 29 in the adjusting head, the holder extending through the aperture 19 and having a

swaged inner end 30 in which the opening is less in diameter than in the remaining portion of the holder. The holder normally extends downwardly in the aperture 19 from the outer end toward the inner end thereof and the gravity pressure tends to hold the head 20 to its seat, the angularity of the holder being adjusted by means of the screws 24 and 25 as is apparent. A steam-conducting pipe 31 is placed in the holder 29 and extends therethrough, being somewhat smaller in diameter than the holder so as to fit closely in the contracted end 30.

A header is provided which preferably comprises a pipe T 32 secured to the inner end of the pipe 31, pipe nipples 33 and 34 secured to opposite sides of the T so as to extend horizontally near the inner side of the front wall 3, two T's 35 and 36 secured to the two nipples respectively and two pipes 37 and 38 secured to the farther sides of the two T's respectively; also two pipe L's 39 and 40 secured to the farther ends of the pipes 37 and 38 respectively; also two jet pipes 41 and 42 secured to the two T's 35 and 36 respectively, and two other jet pipes 43 and 44 secured to the two L's 39 and 40 respectively. The jet pipes preferably extend in a plane corresponding to the plane of inclination of the pipe 31 but in some cases may be varied if desired by turning the nipples 33 and 34 more or less in the T 32. The header in the present case is provided, as will be seen, with four jet pipes which is a suitable number in some cases but in other cases a larger or smaller number of jet pipes may be advantageously employed. Each jet pipe has a reduced end portion 45 adapted to constitute a jet nozzle. Suitable fire proof packing 46 such as asbestos wool is placed in the holder 29 around the pipe 31 so as to permit the pipe to yield slightly in lateral direction in the holder and prevent atmospheric air from passing through. With a suitable number of jet pipes on the header the pipes are placed approximately equi-distant apart and so as to have the two outermost jet tubes in proximity to the side walls of the furnace, and the adjustment is such that the steam jets shall be delivered from the nozzles at considerable distance from the front wall of the furnace and above the grates, and shall be projected toward the bridge wall somewhat below the top of the wall.

A supply pipe 47 is connected with the dome 13 so as to obtain the driest steam possible and it extends to and is connected with the outer end of the pipe 31 so as to constitute a continuous conduit from the boiler to the jet pipes without admitting atmospheric air thereto, the pipe 47 having suitable pipe fittings connected therewith as will be understood, and it has a suitable regulating valve

48 conveniently connected therewith for regulating the passage of the steam to the jet pipes, particularly in order to prevent the steam from escaping from the jet nozzles at undesirably high pressure or velocity, and in order to ascertain the pressure of the steam passing to the header a pipe 49 is connected with the pipe 47 between the regulating valve and the header and has a pressure gage 50 connected therewith, so that the intensity of the jets may be intelligently governed. It being desirable to use very hot and dry steam, it may be found desirable in some cases to protect the supply pipe 47 from the atmosphere so as to prevent radiation of heat from the steam, and it will be apparent that the steam in the header and relatively long jet pipes becomes superheated before escaping expansively into the furnace.

In some cases, especially when very high steam pressure is carried in the boiler and it is possible to conduct the steam at high pressure and in dry condition to the header, fairly good results may be obtained without superheating the steam in the furnace and in such case in order to protect the header and the jet pipes from the heat of the furnace they are covered with suitable fire proof material such as asbestos formed in sections and placed thereon, there being a cover section 51 placed on the T 32, sections 52 and 53 placed on the nipples 33 and 34 respectively, sections 54 and 55 covering the T's 35 and 36 respectively, and other sections 56 and 57 covering the pipes 37 and 38 respectively, sections 58 and 59 covering the jet pipes 41 and 42 respectively, elbow sections 60 and 61 covering the L's 39 and 40 respectively and other sections 62 and 63 covering the jet pipes 43 and 44 respectively. The sections 58, 59, 62, 63 each have a tapering end portion 64 corresponding somewhat to the shape of the nozzle 45 externally.

When equipping the furnace with the apparatus the adjustment of the head 20 is made so that the jet pipes shall project at an approximately correct angle, but the most advantageous position of the jet pipes is obtained as a result of observation of the effect of the steam jets in the furnace, the adjusting screws 24 and 25 being manipulated until the position of the jet pipes is obtained that will give the best results desired. It will be understood that while the weight of the header and jet tubes tends to move the adjusting screw 25 away from the front 12 this tendency is conveniently resisted by the weight of the steam pipe 47 serving practically as a counter-balance, and after the proper adjustments have been made it is not usually required to make further adjustments, so that the head 20 may then be permanently secured against movement in its socket, in any suitable manner. Each jet

pipe should be proportioned in length to the furnace to which the appliance is applied, so that the delivery end of the pipe shall be at a point approximately one-third of the distance from the front wall to the bridge wall

It will be seen from the foregoing that the relatively long jet pipes delivering steam at considerable distance from the front of the furnace, which in practice has been found to be approximately one-third of the length of the furnace, leaves space above the grates at the front wall so as to in effect constitute a vacuum or lazy chamber to temporarily retain the smoky gases from a fresh supply of fuel on the fire, usually thrown off from bituminous coal.

In practical use, upon applying a fresh supply of fuel to the fire box steam is freely admitted to the header and the jet pipes, and the damper is opened. Upon closing the furnace doors the supply of steam is gradually diminished and the damper is partially closed to any degree desired so as to retain all the heat units possible in the furnace and boiler tubes after the smoke has been consumed in the furnace. The steam escaping from the jet pipes is converted into steam gas or hydrogen gas which mixes with the fuel gases and the hot air rising through the grates and the fire, resulting in the formation of a highly combustible gaseous mixture, and although the steam jets are gentle in their action so as to not force the unconsumed smoke over the bridge wall and out of the chimney, whirling currents are produced above the coal fire so that the smoke at relatively low temperature is gradually taken up and mixed with the hotter and highly combustible gases and is therein consumed. The jet pipes as arranged serve to produce substantially a sheet of gaseous vapor extending entirely across the furnace laterally and from the jet nozzles downwardly to the bridge wall, so as to prevent gentle natural draft from drawing the smoke immediately out over the bridge wall, but retains the smoke below the jet pipes to become more highly heated by the fire and gradually taken up and consumed with the highly combustible gaseous mixture from the hotter forward portion of the furnace, the gases of combustion in a high state of incandescence passing in a long flame over the bridge wall and on through the boiler tubes, with the result that the smoke is effectually consumed with a relatively low rate of consumption of fuel and the minimum expenditure of steam from the jets.

Having thus described the invention, what is claimed as new is—

1. A smoke consumer appliance comprising a supporting head, a set screw inserted in the head, a tubular holder inserted in the head and engaged by the set screw, a steam

pipe extending loosely through the head, packing tightly inserted in the holder and about the exterior of the steam pipe, a header connected to the steam pipe, jet pipes connected to the header, and a plurality of adjusting screws mounted in the supporting head and adapted to adjust the angle or elevation of the jet pipes.

2. A smoke consumer appliance including an adjusting-head, a tubular holder secured at one end to the head, the opposite end of the holder being contracted in diameter, a steam-pipe extending loosely through the holder and having contact with and filling the contracted end thereof, yielding packing inserted tightly between the steam-pipe and the holder, a hollow header connected to the steam-pipe adjacently to the contracted end of the holder, and a plurality of jet-pipes connected to the header.

3. In a smoke consumer, the combination with a furnace having a front wall provided with an aperture and also a bridge wall distant from the front wall, grates between the front wall and the bridge wall, and a steam boiler mounted in the furnace; of a furnace-front at the outer side of the front wall and having an aperture therein at the aperture in the wall, the furnace front having a ball-socket in its outer side extending about the aperture therein, an adjusting-head having a ball-face seated adjustably in the ball-socket and provided also with two adjusting-screws extending to the furnace-front above and below the ball-socket, a tubular holder having one end inserted in and secured to the adjusting-head, the holder extending adjustably through the aperture in the front wall and having a contracted inner end, a steam-pipe extending through the holder and filling said contracted end, elastic packing in said holder extending about said steam-pipe, a hollow header connected to the inner end of said steam-pipe, a supply-pipe connected with the steam-boiler and also to said steam-pipe, a regulating valve connected with said supply-pipe, and a pressure-gage connected with said supply-pipe between said valve and said steam-pipe.

4. In a smoke consumer, the combination with a furnace having a furnace wall provided with an aperture and also a bridge wall, grates supported in the furnace, and a steam boiler mounted in the furnace, of a metallic front secured to the outer side of the furnace wall and having an aperture therein at the aperture in the wall, the metallic front having a ball-socket in its outer side extending about the aperture therein, an adjusting head having a ball-face seated adjustably in the ball-socket and provided with securing means, a tubular holder having one end fixedly supported by the adjusting head, the holder extending adjustably through the aperture in the furnace wall

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 ed with the steam boiler and also to said

steam pipe, and a regulating valve connect-
 ed with said supply pipe.

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

ALMOND E. WILSON.

Witnesses:

A. O. ABEL,
 O. WAITHER.

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