No. 727,410. PATENTED MAY 5, 1903.

J. A. McALLISTER.

SMOKE CONSUMING FURNACE.

APPLICATION FILED SEPT. 15, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

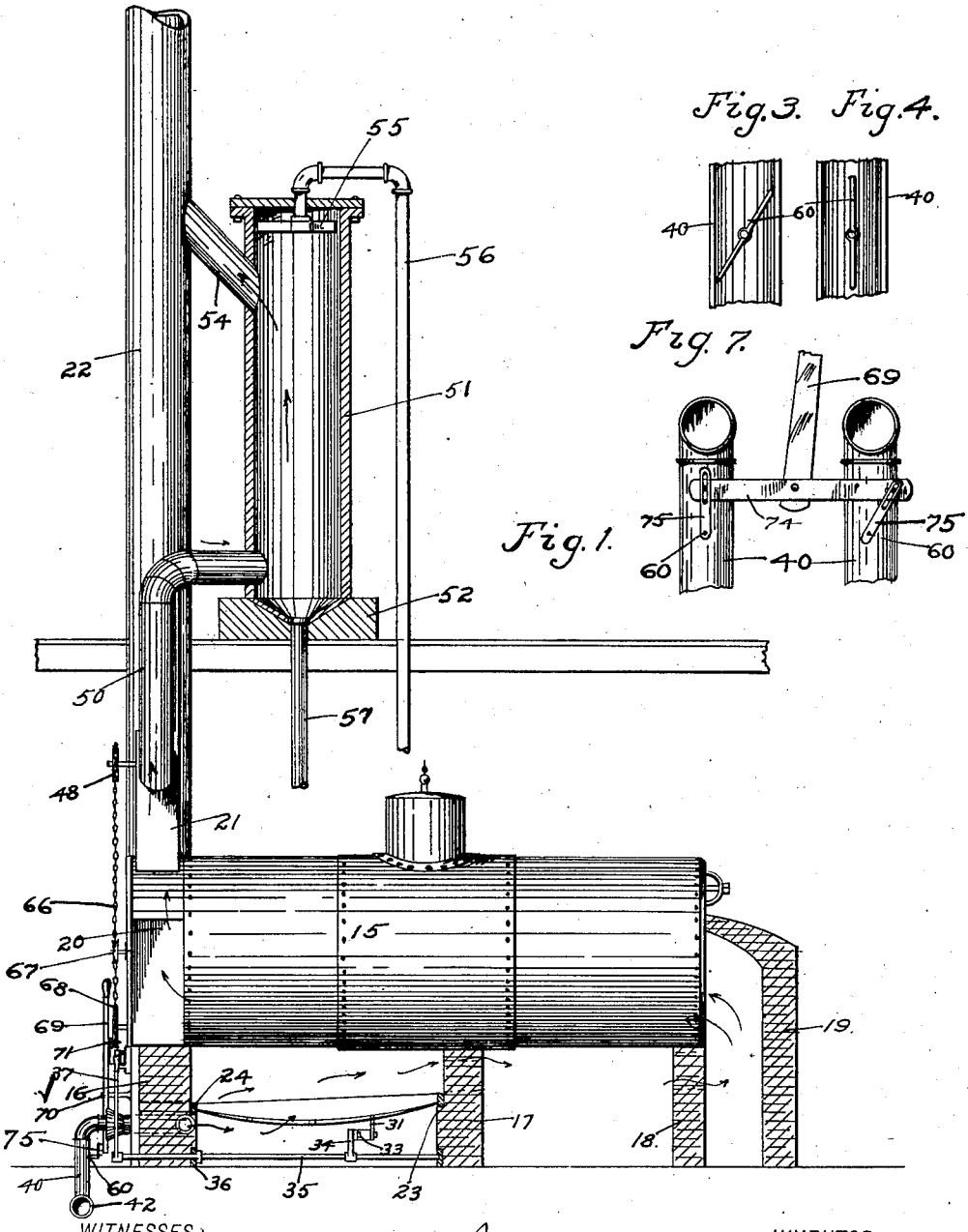


Fig. 1.

Fig. 3. Fig. 4.

Fig. 7.

WITNESSES:

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.

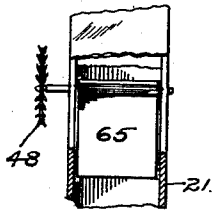


Fig. 6.

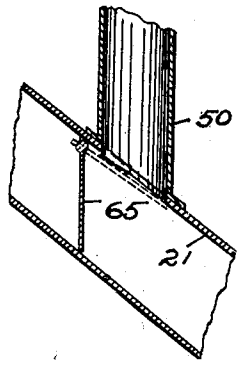


Fig. 2.

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UNITED STATES PATENT OFFICE.

JAMES A. McALLISTER, OF INDIANAPOLIS, INDIANA, ASSIGNOR OF FIFTY-ONE ONE-HUNDREDTHS TO ROBERT C. FINCH, OF INDIANAPOLIS, INDIANA.

SMOKE-CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 727,410, dated May 5, 1903.

Application filed September 15, 1902. Serial No. 123,478. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. McALLISTER, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Smoke-Consuming Furnace; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like numerals refer to like parts.

This invention relates to improvements in the smoke-consuming furnace shown in application filed by me on November 21, 1901, Serial No. 83,119.

One feature of the invention consists in providing a single conveniently-located means for operating all of the dampers, and which means holds the door leading to the live fire closed, so that only the door leading to the fire needing to be replenished with fuel can be opened.

Another feature of the invention consists in providing a cold-water spray through which the smoke passes in its second movement from the furnace toward the smoke-stack, which washes the black particles out of the smoke, so that only the clean unconsumed gases will pass through the smoke-stack.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a longitudinal vertical section to one side of the center of a furnace and boiler with the boiler and pipes shown in elevation and containing a water-spray in central vertical section and with the upper end of the smoke-stack broken away. Fig. 2 is a front elevation of a furnace and boiler containing my improvements with parts broken away, as shown. Figs. 3 and 4 are detail views of the valve or damper for regulating the entrance to the furnace-chamber of the returned smoke. Figs. 5 and 6 are detail sectional views of the damper for regulating the movement of the current through the smoke-stack. Fig. 7 is a detail sectional view of the means for controlling the admission of returning smoke to the furnace-chambers.

As appears in Fig. 1, there is shown a boiler 15, with a front wall 16 below the same, a bridge-wall 17, the back stand 18, and the back wall 19. The boiler is of a common type, with a series of flues in it, through which the heat passes from the rear to the front into the breeching 20, from which a pipe 21 leads to the smoke-stack 22. The furnace-chamber is located between the walls 16 and 17, and there is a ledge at 23 in the opposing faces of said walls, upon which the bearing-bars 24 are secured. The unconsumed smoke is brought back from the smoke-stack through the return-pipe 40, as seen in Fig. 1, that passes through the front wall and enters the ash-pit below the grate-bars. An air-mixer 41 is provided at the inlet end of the pipe 40 to cause air to enter and mix with the smoke. The pipes 40 lead from the transverse pipe 42, that comes from the fan 43, mounted on the stand 44 and driven by the belt 45. Said fan 43 is fed by pipe 46, that leads from the smoke-stack above the pipes 21, that enter it from the breeching of the boilers, whereby the smoke is drawn from the smoke-stack and returned beneath the grate-bars.

As in my former application, I here provide a battery of boilers and furnaces, two being shown, although one furnace may be used if it is divided into two furnace-chambers.

The fan will draw the smoke out of the smoke-stack without a damper being placed above the pipe 46. However, dampers 65 are provided in the pipes 21 and are actuated by the wheels 48, whereby one of said pipes 21 may be opened while the other is closed. A pipe 50 leads from each pipe 21 at a point preceding the damper or valve operated by the handle 48 to the spray-chamber 51. This chamber is a vertical one mounted on the block 52, that is supported on the timbers 52 on a higher level than the boilers. The pipes 50 under the spray-chamber at its lower end, and a pipe 54 leads from the upper end of said chamber to the smoke-stack. At the upper end of the spray-chamber a spray-head 55 is mounted and is fed from the water-pipe 56, that leads from any suitable source of supply. Said spray-chamber is provided with a drain-pipe 57.

The pipes 40, through which the return

smoke enters the furnace below the grate-bars, are controlled by dampers 60. (Seen in Figs. 11 and 12.)

The operation is as follows: Assuming the furnace-chamber to be clean, the coal or fuel is supplied and a fire started in one furnace. For this beginning fire the outlet through the smoke-stack would have to be kept clear until steam is gotten up and the fire is under way, as has been the custom heretofore. After this start, however, the two furnaces are fired alternately. When one furnace is fired, the other has a live fire in it, so that the damper 60 is closed that leads to the furnace being fired, while the other damper 60 is opened so that the return smoke will pass through the live fire while the other furnace is being fired. In such case the passage-way from the green fire to the smoke-stack will be kept clear and open, so that the smoke will be drawn by the fan from the smoke-stack through the pipe 46 and forced beneath the live fire. While that is being done the passage-way from the live fire to the lower end of the smoke-stack is closed by the damper actuated by the handle 48, so that from the live fire the smoke does not directly enter the smoke-stack, but, in the first place, enters the spray-chamber 51 and passes therethrough and through the pipe 54 to the smoke-stack above. This smoke from the live fire has little, if any, unconsumed matter in it, and what unconsumed matter there may be in it may be washed out of the smoke through the spray and carried down through the waste-pipe, so that clean smoke or mere gases will pass out of the smoke-stack. By alternate firing and shifting the dampers, as explained, it is observed that no smoke from the green fire passes out of the smoke-stack, but always returns through the live fire, and the only smoke that passes out of the smoke-stack comes from the live fire, and even it is cleaned by having passed through the spray-chamber. The dampers 60 and 65 are actuated simultaneously, the dampers on one side of the furnace being closed when the others are opened by means of the chain 66, that runs over the sprocket-wheels 48 and past the pulleys 67 over the sprocket-wheels 68. The chain 66 is actuated by the lever 69, which is pivoted at 70 to the front of the furnace. Said lever is connected with the chain by the block 71, which has secured to it a laterally-movable bar 72, with its ends passing through brackets 73 near the furnace-doors on each side. The length of the bar 73 is such that when the lever is turned in one direction for actuating the chain 66 and the dampers the door of one furnace will be closed and the other opened, and when said lever is reversed the opposite effect will be produced on the doors of the furnace.

To the lower end of the lever 69 there is pivoted a horizontal bar 74, which actuates the two dampers 60 in the pipe 40 through the crank 75 on the stems of said valves.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a furnace, a plurality of furnace-chambers, a smoke-stack, a conduit from each furnace-chamber to the smoke-stack, means for returning the smoke from the smoke-stack to the furnace-chambers, a damper for regulating the return of the smoke to each furnace-chamber, a spray-chamber, a pipe leading to the spray-chamber from each conduit entering the smoke-stack, a damper in each of such conduits between the smoke-stack and pipes leading to the spray-chamber, and a pipe leading from the spray-chamber to the smoke-stack.

2. In a furnace, a plurality of furnace-chambers, a smoke-stack, a conduit from each furnace-chamber to the smoke-stack, means for returning the smoke from the smoke-stack to the furnace-chambers, dampers for regulating the return of the smoke to each furnace-chamber, doors leading to the furnace-chambers, means for alternately locking the doors to said furnace-chambers, and a single means for actuating said dampers and the door-locking means.

3. In a furnace, a plurality of furnace-chambers, a smoke-stack, a conduit from each furnace-chamber to the smoke-stack, a damper in each of said conduits, a conduit leading from the smoke-stack divided into branches with one branch leading to each furnace-chamber, means for returning the smoke therethrough, a damper in each branch of the return-conduit that leads to the furnace-chambers, and a single means for actuating all of said dampers so as to open the damper in the one conduit leading to the smoke-stack and the branch conduit leading to the oppositely-located furnace-chamber and to close the other dampers.

In witness whereof I have hereunto affixed my signature in the presence of the witnesses herein named.

JAMES A. McALLISTER.

Witnesses:
NELLIE ALLEMONG,
F. W. WOERNER.