Improvement in SMOKE STACKS.

Landrow Bell. Inventor.

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115153

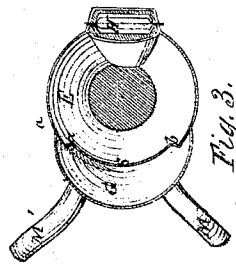

Fig. 3.
(Sect. on line x.x. of Fig. 1.)

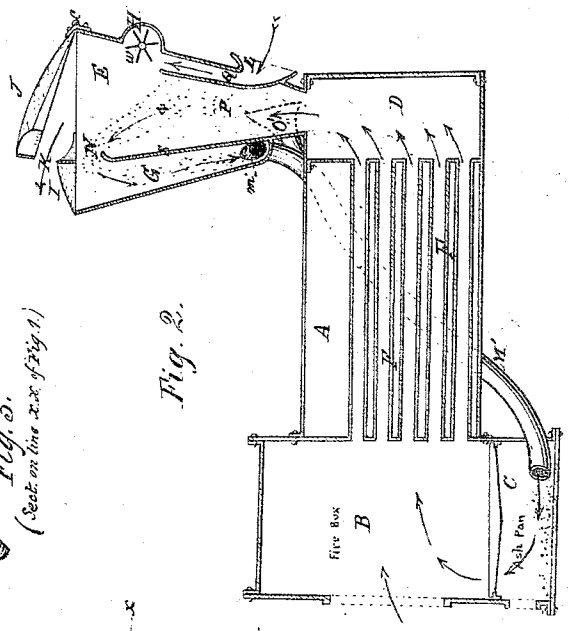

Fig. 2.

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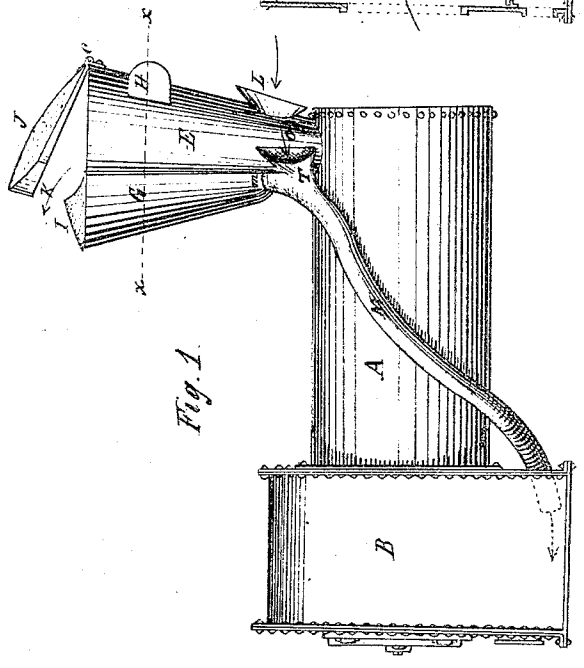

Fig. 1.

Witnesses. { A. L. Stuart
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UNITED STATES PATENT OFFICE.

LANDROW BELL, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN SMOKE-STACKS FOR LOCOMOTIVES.

Specification forming part of Letters Patent No. 115,153, dated May 23, 1871; antedated May 19, 1871.

To whom it may concern:

Be it known that I, LANDROW BELL, of Washington city, District of Columbia, have invented a new and useful Improvement in Smoke-Stacks or Chimneys for Locomotives and other Engines, of which the following is a full and complete description, reference being had to the accompanying drawing, in which—

Figure 1 is a side elevation. Fig. 2 is a vertical longitudinal section of so much of a locomotive-engine as is necessary to illustrate this invention. Fig. 3 is a horizontal section on the line *x x* of Fig. 1.

The object of my invention is to arrest the sparks and cinders which pass out of the smoke-stack, to the great annoyance of passengers, and great danger to combustible property contiguous to the line of steam travel; and it consists in the application of flues and channels, air-funnels, fans, wire-screens, and conducting-tubes, in the manner substantially as about to be described.

The locomotive is constructed in the ordinary form, except the smoke-stack, which is provided with an additional flue or passage, and other modifications required to create a downward draft or current through the same.

B is the fire-box of the boiler A, and F F are the boiler flues or tubes. D is the smoke-box, and E the smoke-stack, (all of ordinary construction,) by which the draft from the fire, after passing through the flues or tubes into the smoke-box, passes up the stack and out of the chimney.

Along with the smoke, particularly during certain operations necessary in firing, a large quantity of hot sparks and cinders is also carried by the force of the draft from the furnace into the open air along with the smoke, to the serious annoyance of passengers, much damage to clothing, upholstering, &c., and frequently causing disastrous conflagrations of property contiguous to the line. Many miles of snow-sheds of the Pacific railroad have been already consumed by fire originating from sparks from the locomotive.

The ordinary expedient for arresting these sparks has been to cover the top of the chimney with a bonnet of woven wire, which permits the passage of the smoke and gas, but retains the sparks and cinders. In practice this plan has not been effectual. When the apertures in the screen are small enough to retain the sparks the bonnet offers such serious resistance to the draft as to interfere to an injurious extent with the generation of steam. On the other hand, if the size of the meshes of the gauze is increased sufficiently to admit of a free draft, an insufficient resistance is opposed to the passage of the sparks, &c. There is, moreover, a constant tendency in the screens to clog up and become useless, and all cinders and sparks arrested by them fall back into the stack and smoke-box, and cause further obstruction and difficulty. The consequence has been a compromise between the two difficulties, which, like all compromises, has partially defeated both objects, so that with these bonnets in use we are continually annoyed by sparks and cinders, and valuable property continues to be destroyed almost as extensively as ever.

To obviate these difficulties I construct my chimney E with an additional crescent-shaped flue, G, a portion of the main chimney being cut away at N, between the points *a b*, to form a passage between its upper edge and the edge of the fixed crescent-shaped portion of the wire-gauze bonnet I, to allow the sparks and cinders to pass over into the supplementary flue G. Over the top of the chimney proper E is a movable bonnet of wire-work, J, hinged to the top of the stack at *c*, and so arranged as to be adjustable at any required position between fully closed and wide open. It is represented in the drawing as partially open, which will probably be the most advantageous position for general use. The crescent-shaped flue G is closed at a point near the bottom of the stack; but from its bottom two pipes, M M′, branch out and pass down and around each side of the boiler and enter the back of the ash-pan, into which they discharge, as shown in Fig. 2, the sparks and cinders being represented by stipple dots and the currents by arrows. In order to produce a proper current within these tubes a short branch-pipe, T, is affixed to each near the point where it enters the flue G, which branches are brought forward along the side of the base of the smoke-stack, and are provided with funnels O to catch the air and force it down the pipes M M′. The current of sparks and cinders is forced un-

der the bonnet I, and at the same time the draft of the chimney greatly improved by the introduction of an automatic fan-blower, *w*, located in a hood, H, formed in the side of the stack, near its top. This fan is rotated by a current of air caught by the funnel L and forced upward through the air-channel Q against the fan-wheel *w*, the rotation of which has a tendency to cause the current of cinders to pass in the direction of the arrow Z under the bonnet I, when they pass, by the combined forces of gravity, momentum, and draft, down the flue G, while the main volume of smoke and gas passes out through the opening between the two sections of the compound bonnet I J, as well as through the meshes of the woven wire. Some, and frequently, perhaps, all, the smoke would also pass with the cinders and ashes down the flue G and pipes M M′ into the ash-pan, whence the gases and unconsumed carbon are drawn up through the grate-bars and through the glowing furnace and consumed, adding to the heat instead of passing out into the air to form a dangerous nuisance. The bonnet J is made adjustable, to accommodate itself to the varying conditions of the furnace, the velocity of the train, and the condition of the atmosphere, the wind, &c. It would require at times to be widely opened, and at others might admit of being entirely closed.

The operation of this apparatus is obvious. I will, however, briefly describe it. The products of combustion, consisting chiefly of carbonic-oxide gas, and mechanical particles of carbon and unconsumed fuel, constituting smoke, sparks, cinders, and ashes, are drawn by a powerful draft through the tube-flues F F into the smoke-box D and up the stack E. The heavier mechanical particles naturally incline to the rear side of the chimney, and have thereupon a tendency to impinge against the under side of the bonnet I and fall into the flue G, which tendency is much increased by the draft down the flue established by the funnels O; and still further increased, and the tendency of the sparks to the rear enhanced, by the centrifugal action of the fan-wheel *w*, actuated by an independent current of air caught by the funnel L and forced up the channel Q by the velocity of the locomotive through the atmosphere.

The wire bonnets are made of sufficiently finely-woven wire to arrest all the objectionable sparks and cinders passing up the stack, and returning them, with more or less unconsumed gases and smoke, to the ash-pan, where the former are deposited, and the latter, ascending through the fire, are perfectly consumed, thus adding to the effective heat of the furnace, instead of going to vitiate the atmosphere and cause conflagrations and disasters.

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

1. The supplementary flue G provided with the supplementary bonnet I and pipes M M′ leading into the ash-pan, substantially as and for the purpose set forth.

2. The combination of the flue G, pipes M M′, branches T T′, and funnels O O′, substantially as and for the purpose set forth.

3. The fan-wheel *w*, channel Q, and funnel L, in combination with the flue G, arranged substantially as and for the purpose set forth.

4. The double adjustable bonnet, composed of the two parts I J, in combination with the supplementary flue G and pipes M M′, substantially as and for the purpose set forth.

LANDROW BELL.

Witnesses:
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