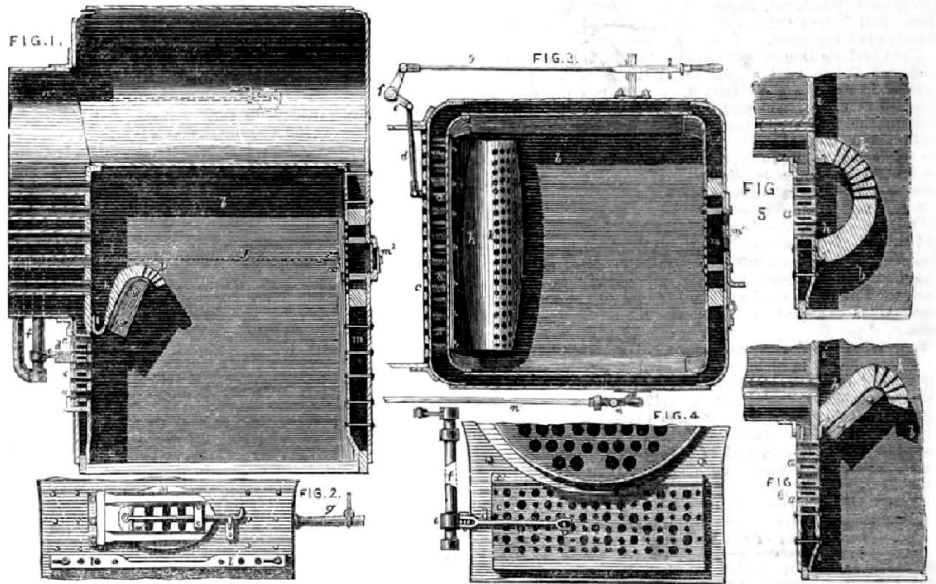


with these arrangements tube stays, placed at the front and other convenient parts of the fire box; and also arrangements in the furnace doors for the admission of air to the fire box above the fuel, both the air-tube stays and furnace doors being provided with valves or slides to regulate or shut off the supply of air. The patentee also proposes to use, in combination with the above arrangements, a jet of steam in the smoke box or chimney when the locomotive is standing, to create or increase the draught through the air tubes and fire bars when required.

Fig. 1 is a side elevation of part of a locomotive boiler; Fig. 2, a view of part of the fire box end of a locomotive; Fig. 3, a plan of the fire box in section; and Fig. 4, a transverse section of part of the boiler, looking at the back of the fire box from the smoke box end. The series of tube stays through the water space on the flue tube-plate side of the fire box *b* are marked *a*, the number and arrange-

made of iron), and forms a chamber into which the air from the tube stays *a* first enters, and from which it passes through the perforations *k*, which distribute it in jets. In this arrangement the fuel is prevented from entering the air-tube stays *a*. Air-tube stays *l* are placed in front of the fire box *b*, as shown in Fig. 2, and the furnace door *m* has also openings through which air can be admitted. The door is made double, and the inner plate is perforated by numerous small holes, so as to spread and distribute the air; this is seen best in Fig. 3. Both the air tube stays *l* in front of the fire box and the openings in the furnace door *m* have slides, on the same principle as that marked *c* for the air tube stays at the back of the fire box, for regulating and stopping the passage of air, *l* being the slide plate for the air tube stays *l*, and *m'* the slide for the furnace door *m*. The steam to give the draft when the engine is standing is taken from a tap *n* in the boiler, convenient to the hand of the fireman, and con-



ment of which are seen best in Fig. 4. A plate *c* is arranged at the outside of the fire box *b*, so as to slide in grooves formed by ledges *ci* fixed to the fire box. This plate *c* is perforated with as many holes as there are tube stays *a*, which holes are so placed that, when the plate *c* is in one position, they will coincide with the stay tubes *a*, but when moved to one side the spaces between the holes in the plate *c* will partly or wholly cover the ends of the tube stays *a*, according to the extent of side movement given to it. To the sliding plate *c* one end of a rod *d* is jointed, the other end being jointed with an arm *e* on the lower end of a vertical shaft *f* carried in bearings secured to the side of the fire box; the upper end of the shaft *f* having also an arm upon it, to which a rod *g* is jointed, forming a handle by which the fireman can give motion to the slide plate *c* to regulate the draught. The partition *k* across the fire box, as shown in Fig. 1, is of iron, and is perforated with a number of holes *k*, the purpose of which is to distribute the air admitted through the tube stays *a* in numerous jets, so as to insure the mixture of the air and combustible gases. This partition or deflector *k* is screwed to the tube plate *h*, and rests at the ends on flanges secured to the sides of the fire box *b*. Figs. 5 and 6 are detached sectional views of part of a fire box *b*, showing the application and mode of securing distributors or deflectors *k* formed of fire brick material. Fig. 6 shows a deflector or partition *k* similar to that represented in Fig. 1, but made of fire brick material; that shown in Fig. 5 is of different shape (it may be

veyed from this tap by a pipe *n* to the chimney of the locomotive, the end of the pipe *n* entering at the junction of the two exhaust pipes, and opposite the centre of the blast orifice.

JENKINS' FIRE BOXES OF LOCOMOTIVE BOILERS.
PATENT DATED 14TH SEPTEMBER, 1857.

The object of this invention, by William Jenkins, of Miles Platting, superintendent of the Lancashire and Yorkshire Railway Company, is to adapt the locomotive fire box for the perfect combustion of the fuel and the prevention of smoke arising from it, the improvements being applicable to locomotives of the ordinary construction and now in use, and at a small cost. The invention consists in placing a series of tubes (answering as stays) in the fire box, on the tube plate side, so as to admit air to the fuel above the fire bars; the outside ends of these tubes have a valve arrangement to regulate the quantity of air to be passed through them, or entirely to shut it off; and in combining with these arrangements a partition of iron or other material passing across the fire box, the object of which is to prevent the air admitted through the tube stays from passing directly to the flue tubes of the boiler, this partition acting to cause the air admitted to mix with the combustible gases and ignite them, thus preventing the formation of smoke. The invention further consists in combining