Specification of John Rawe the younger and John Boase : tubular boilers, &c.; : method of guiding steam carriages.

Contributors

Rawe, John.
Boase, John.

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A.D. 1830 . . . . . N° 5956.

SPECIFICATION

OF

JOHN RAWE THE YOUNGER

AND

JOHN BOASE.

TUBULAR BOILERS, &c.; METHOD OF GUIDING STEAM CARRIAGES.

LONDON:

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A.D. 1830 . . . . . N° 5956.

Tubular Boilers, &c.; Method of Guiding Steam Carriages.

RAWE AND BOASE'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, JOHN RAWE, the younger, of Albany Street, Regent's Park, in the County of Middlesex (being one of the people called Quakers), and JOHN BOASE, of the same place, Gentleman, send greeting.

WHEREAS His present most Excellent Majesty King William the Fourth, by His Letters Patent under the Great Seal of Great Britain, bearing date at Westminster, the Nineteenth day of July, One thousand eight hundred and thirty, in the first year of His reign, did, for Himself, His heirs and successors, give and grant unto us, the said John Rawe, the younger, and John Boase, His especial licence that we, the said John Rawe, the younger, and John Boase, our ex̃ors, adm̃ors, and assigns, or such others as we, the said John Rawe, the younger, and John Boase, our ex̃ors, adm̃ors, or assigns, should at any time agree with, and no others, from time to time and all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick upon Tweed, and also in all His Majesty's Colonies and Plantations abroad, our Invention of "CERTAIN IMPROVEMENTS ON STEAM CARRIAGES AND IN BOILERS, AND A METHOD OF PRODUCING INCREASED DRAFT;" in which said Letters Patent is contained a proviso obliging us, or one of us, the said John Rawe, the younger, and John Boase, by an instrument in writing under our or one of our hands and seals, particularly to describe and ascertain the nature of our said Invention, and in

what manner the same is to be performed, and to cause the same to be inrolled in His Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said in part recited Letters Patent, as in and by the same, reference being thereunto had, may more fully and at large appear.

NOW KNOW YE, that in compliance with the said proviso, we, the said John Rawe, the younger, and John Boase, do hereby declare the nature of our said Invention to consist, first, in a boiler composed of a novel arrangement of spiral tubes; secondly, in a method for creating increased draft for the fire of the said boiler, and to all other boilers to which the same may be applied; and, thirdly, in a new apparatus for guiding steam carriages, as also a new mode of fixing the main or driving cranked axle to the propelling wheels of the carriage, and the application of rods or stays to the cranked axle to allow of the engines to be supported on springs and of regulating the supply of water to the boiler, and in further compliance with the said proviso, we the said John Rawe, the younger, and John Boase, do hereby describe the manner in which our said Invention is to be performed, by the following description thereof, reference being had to the Drawings annexed, and to the figures and letters thereon (that is to say):—

Description of the Drawings.

Figure 1 represents a side elevation of a steam carriage, with our said improvements partly shown in section, the better to explain the Invention. A is the frame of wrought iron; B, B, B, the steam boiler or generator; C, one of the propelling steam cylinders, there being one on each side of the carriage; D, the cranked axle; E, E, one of the propelling wheels; F, F, F, F, iron arms or stays, securely keyed to the axle D, and bolted at their extremities through the iron ring G, G, which is screwed to the spokes of the propelling wheel, and thus communicate the rotary motion from the axle; L, L, one of the fore wheels; M, the guiding wheel, which will be hereafter explained; 5 is a lever handle for operating on the guide wheel, and *g* is a handle for regulating the steam; J is a spiral spring, inserted between the transit iron of the front wheels and the bar to which the guide wheel is attached; there is a nut and screw on the axis of the spring to regulate the necessary degree of pressure on the guide wheel, according to the state of the road; W is the coach body, for the passengers; S is the water tank; and T is the place for the stoker or engine attendant.

Having now described the principal arrangements of the carriage, as represented in Figure 1, we will proceed to describe the boiler in detail. It

consists of a series of spiral tubes, one coil within the other, producing by such combination a spirally inclined plane, with a cylindrical vessel *b* in its centre; the fire bars are placed about a foot below the lowermost ends of the spiral tubes, which are supported in their places by small bars framed across from the sides of the boiler to the cylinder in the centre. The whole of the boiler and furnace is enclosed by a case of sheet iron fitting tight around it, and this case is again surrounded by a larger case of sheet iron, leaving about two inches between them; the vessel *b*, which for reasons hereafter explained we call the float chamber, the lower part of which is in the form of an inverted cone, and is continued down through the fire bars, having a flange at its lower end, to which is screwed a solid iron cap. A similar cap and flange closes the upper end of the chamber or vessel; a straight piece of tube is inserted in the centre of the said chamber, and projects a short way through both caps, in which it is made stanch by nuts and packing on the outsides: both ends of this tube are open for the purposes herein-after explained. Within the float chamber there is a copper float, from which a rod passes downwards through a small stuffing box in the lower cap, and is connected by a lever with the steam cock of the engine or cylinder which works the pump that feeds the supply pipe; and thus the float, by rising and falling, regulates the supply. The upper ends of the several spiral tubes open into a strong receptacle *e*, to which they are firmly secured in a steam-tight manner; and the lower ends of the said tubes open into another similar receptacle *d*, to which they are also properly fastened, which may be, as represented, by hollow screwed bolts, with nuts and collars, in the manner following:—A small tube *f* is fixed to the end of each of the spiral tubes, and each of the small tubes is passed through the receptacles; and the shoulders formed by the ends of the large tubes are, with suitable packing interposed, brought by means of screwed nuts *r*, close up to the sides of the receptacles, which it will be seen by the Drawing at *d*, are flattered for the purpose; solid plugs *p* are screwed into the ends of the small tubes, which can be taken out to allow the deposit of the water to be removed. The steam pipe in our boiler commences at the top of the float chamber *b*, and is carried down by the side of and in contact with the inner casing, and also three or four times round the furnace chamber, thus forming a protection to the casing, while the steam derives in consequence an increase of expansive force. In order to rise our improved boiler, water is forced by the feed pump into the lower receptacle *d*; it then flows through apertures in the small tubes *f*, into the lower ends of the spiral tubes; there ebulition takes place, and the water mixed with steam is driven up and thro' the spiral tubes. The inclined position of these tubes gives the water a tendency to flow back under the

steam; some, however, will be forced on, the quantity of which will decrease as it ascends by being converted into steam on arriving at the upper receptacle *e*. A very small quantity of water will be contained in the steam which passes from the upper receptacle *e* into the float chamber *b*, where the water falls to the bottom and supports the float, while the steam passes into the steam pipe; when a greater quantity of water accumulates than is evaporated in the float chamber, a rise of the float will be produced, and a proportionate decrease made in the quantity of water pumped into the boiler, occasioned by the communication, as before described, of the float with the steam cock of the small engine. K, K, is an apparatus for producing draft through the furnace and the boiler B, which latter in fact serves the purpose of a flue from the fire by the heat, smoke, &c., following the course of the spiral to the top of the boiler, where it escapes. K, K, are thin plates of metal, fixed to the centre piece *n*, with their flat surfaces inclined to the plane of their motion on to a vertical shaft or axis, which passes down the before-mentioned tube, open at both ends through the centre of the float chamber *b*; at the lower end of this shaft is fixed a toothed pinion working into the large wheel *o*; motion is communicated to this wheel and pinion by a connecting rod proceeding from the piston rod of the small engine or steam clynder, shewn in Figures 2 and 4, herein-after described, applied to a toe-piece in the wheel. By this arrangement the strokes of the small engine give a quick rotary motion to the vanes K, K, and these having their surfaces oblique to the motion, and revolving in the right direction, will strike the air in contact with them upward with force, while the air below rushes in to supply its place, thus constituting a draft in the furnace and flue. When the vanes are set radially, as in the common method, a greater degree of resistance is experienced to the dispersion of the rising column of air than when set by our improved method, which if that of giving them a curvature backward throughout their length, as represented in Drawings Figures 3 and 4, although the method we have described of encreasing the draft of air thro' the flue by means of the curved vanes, produces a beneficial effect in exciting combustion; the peculiar method to which we lay an exclusive claim consists in forcing heated atmospheric air mixed with steam into the midst of the ignited fuel, and for this purpose we employ an apparatus of the following description, reference being made to the Diagrams marked Figures 8 and 9 in elucidation. Figure 8 represents a side elevation, and Fig. 9 a plan, of the apparatus as far as is necessary for explanation. V is a pair of double bellows, which is worked by a small steam engine W, (or any other convenient power,) to inject atmospheric air into the chamber X by means of the

pipe Y, which is shewn as broken off, as the said pipe is first carried round the ash pit, or otherwise subjected to a process of heating prior to its entering into the chamber X. Z is a pipe for conveying steam into the same chamber X. In this chamber the air and steam become intimately mixed, whence they proceeded in their mixed state through vertical tubes 10, 10, (of which there may be any number,) into the hollow bars of the grate, marked in the plan, Figure 9, 11, 11, 11, &c., and thence through the nozzles (represented by small concentric circles) into the fire; 12 is an angle iron formed into a circular ring, and to which are rivitted the bars, whether hollow or otherwise, those having no letters of reference being not necessarily hollow; the parts marked V and Z on the plan denote the bellows and steam pipe, as before explained in Figure 8. Figure 2 is a plan of our improved steam carriage, and whose parts, similar to those in Figure 1, are shewn; similar letters are used to denote them, thus; B, B, is the boiler; E, E, the propelling wheels; F, F, the arms, fixed on the cranked axle, which are bolted to the ring that is fastened to the spokes. H is the small engine which works the feed pump and drives the shaft on which the vanes of the draft apparatus are fixed. N is the induction pipe; and O is the eduction pipe; *i* is a throttle valve acted upon by the handle *g* and the rod *h* connected with it. P, P, are piston rods working in stuffing boxes *a*, *a*. Q, Q, connecting rods to communicate the motion of the piston rods to the cranks of the axle D, which cranks are made at right angles to each other with a throw of eight inches; this axle is placed under the frame A, and attached to it by the two strong springs R, R. The whole of the frame and engine is supported on springs; and to allow springs to be applied to the cranked axle, two strong rods *k*, *k*, are used; each of these is firmly jointed at one end to the frame, and attached at the other end to the cranked axle by bearings, by which means the frame is allowed to rise or fall freely, while derangement thereupon is prevented. The guiding or directing apparatus consists of two rings of iron 1, 2, turned truly to each other; 2 being about half an inch narrower than 1; to the lower ring is attached, by brass bearings, the axle 3 of wheel M; the parts 4 are firmly fixed to the circle 1, and attached at the other end to the front axle U, by two joints; these joints allow the wheel M and parts connected to rise and fall freely, but prevent its side motion without moving the wheels L, L, and axle U, with them. 5, the handles by which the shaft 6 is turned, and motion given to the guide wheel. 7 is a cross piece, resembling that of the handle 5, fixed to the lower end of the shaft 6, near the axle U, having a joint at each end; from these joints proceed the rods 8, 8, connected also by joints at the other

end by the parts 9 proceeding from the bearings on the ring 1. At *z*, *z*, are small antifriction wheels, their axis being formed of bolts that are passed through them and screwed up firmly into the ring 1; each antifriction wheel works in a groove turned in the inside of the ring 2; by these means the rings are screwed and kept concentric with each other, and the ring 2 is at the same time allowed to turn freely. To turn the carriage when in motion, the handle on the side towards which it is required to turn must be pushed forward; this acts through the shaft 6, cross piece 7, and rods 8, 8, on the ring 2, making it traverse under 1; and the wheel M being attached to 2, moves with it and is set at an angle with the line of motion. The carriage proceeding, the wheel M runs out in the angular line and immediately sets the front wheels L, L, in the position to produce the required turn of the carriage, the rapidity of the turn will be exactly in proportion to the angle at which the wheel M is set; 45° is as great as will ever be required. Figure 3 is a plan of the fan or vane for creating the draft; and Figure 4 is a seperate view in section of the float chamber *b*, and part of its internal arrangement with reference to the shaft of the fan and the hollow tube through which that shaft passes, as herein-before described. Figure 5 is a separate view of the common receptacle *d*, and part of the spiral tubes, showing how they are secured to it. Figure 6 is a separate side view of the receptacle only, and Figure 7 is a plan of the float.

Now whereas we claim as our Invention, first, the peculiar arrangement described of the spiral tubes of the boiler and the application of the float and float chamber, in manner aforesaid; secondly, the particular method of creating increased draft, by the forcing of a mixture of heated air and steam through the fire, in manner aforesaid; and thirdly, in directing or guiding the carriage, by means of a wheel or wheels or other suitable apparatus for guiding, situate and acting behind the front axle, as also the manner of fixing the cranked axle to the propelling wheels by means of the arms F, F, F, F, and the rings G, G, and the application of rods or stays to the cranked axle as aforesaid in a direction parallel with the strokes of the engine, to allow the engine to be supported on the axle by springs. And such our Invention being to the best of our knowledge and belief entirely new and never before used within that part of His Majesty's United Kingdom of Great Britain and Ireland called England, His said Dominion of Wales, and Town of Berwick upon Tweed, and also His Majesty's Colonies and Plantations abroad, we do hereby declare this to be our Specification of the same, and that we do verily believe this our said Specification doth comply in all respects, fully

A.D. 1859, JULY 19. Nº 5956.
HAWE & BOASE'S SPECIFICATION.

FIG. 1.

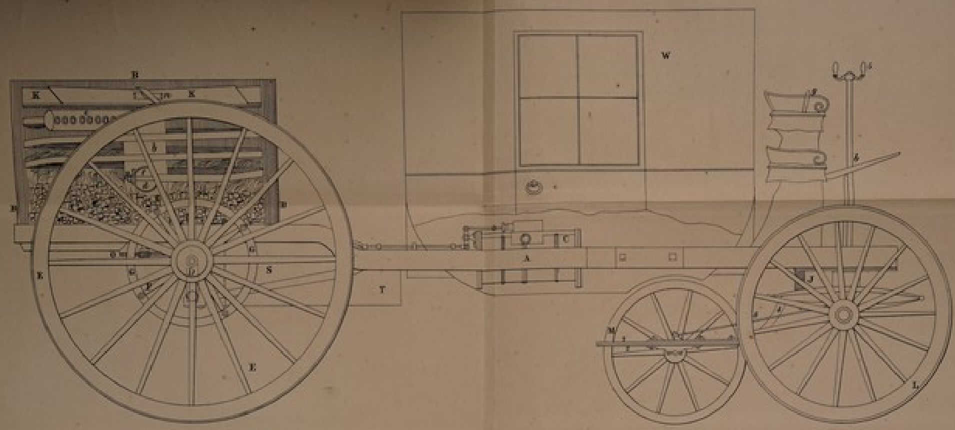

FIG. 3.

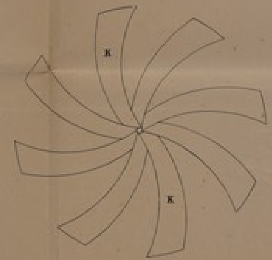

FIG. 2.

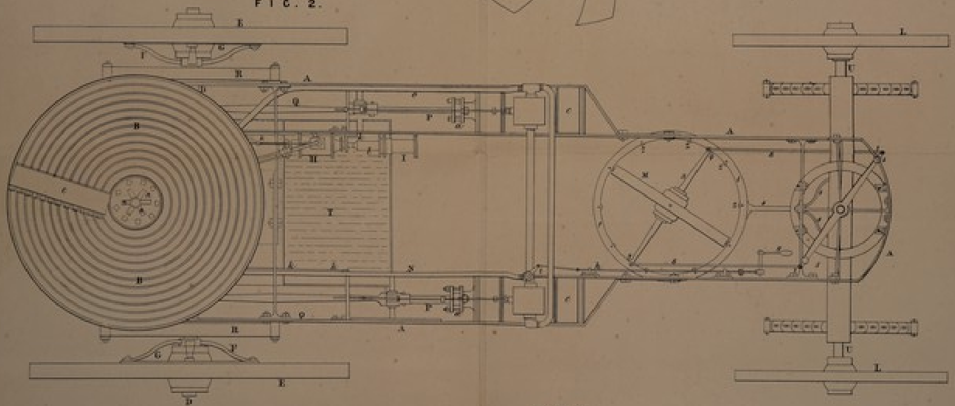

FIG. 6.

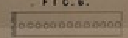

FIG. 5.

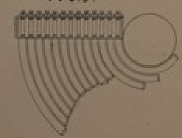

FIG. 4.

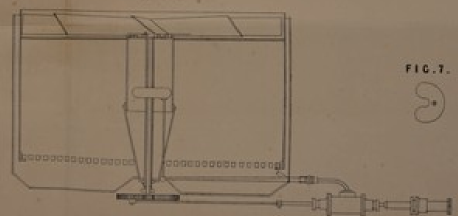

FIG. 7.

The enrolled drawing is colored.

Malby & Sons, Lith.

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A.D. 1830. July 19. № 5,956.
RAWE & BOASE'S Specification.

(2 SHEETS)

FIG. 9.

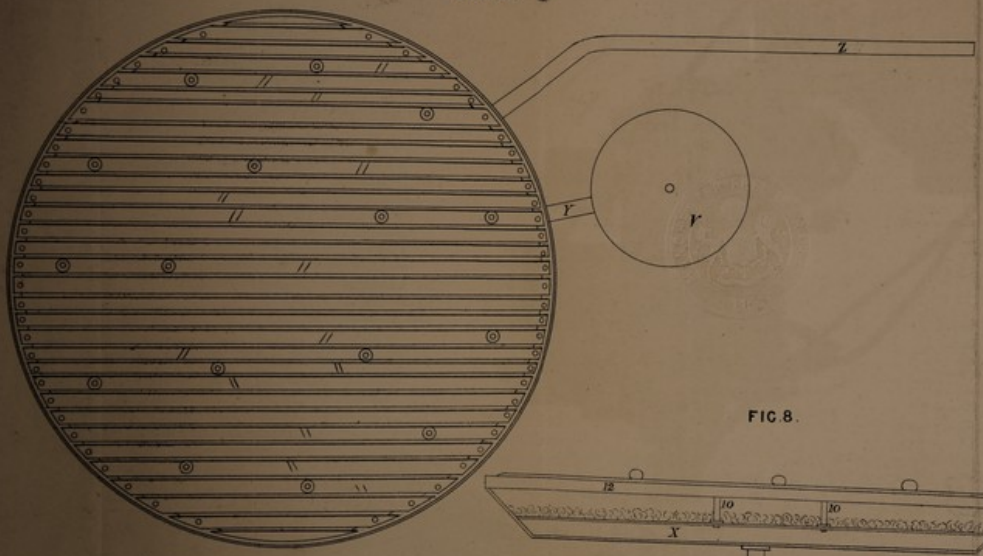
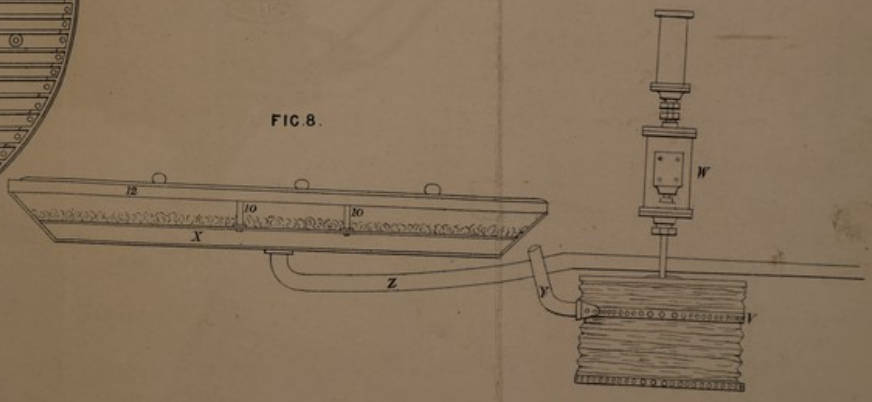


FIG. 8.



The enrolled drawing is colored.

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Printers to the Queens most Excellent Majesty. 1854.

and without reserve or disguise, with the proviso in the said herein-before in part recited Letters Patent contained. Wherefore we do hereby claim to maintain exclusive right and privilege to our said Invention.

In witness whereof, I, the said John Boase, have hereunto set my hand and seal, this Eighteenth day of January, in the first year of the reign of Our Sovereign Lord William the Fourth, by the grace of God of the United Kingdom of Great Britain and Ireland, King, Defender of the Faith, and the year of our Lord One thousand eight hundred and thirty-one.

JOHN (L.S.) BOASE.

AND BE IT REMEMBERED, that on the Eighteenth day of January, in the year of our Lord 1831, the aforesaid John Boase came before our said Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

Cross.

Inrolled the Nineteenth day of January, in the year of our Lord One thousand eight hundred and thirty-one.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1854.