Specification of Thomas Tippett : steam and air engines : and method of applying the same to the propulsion of vessels.

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A.D. 1828 . . . . . N° 5714.

SPECIFICATION

OF

THOMAS TIPPETT.

STEAM AND AIR ENGINES; AND METHOD OF APPLYING THE SAME TO THE PROPULSION OF VESSELS.

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Steam and Air Engines; and Method of Applying the same to the Propulsion of Vessels.

TIPPETT'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, THOMAS TIPPETT, of Gwennap, in the County of Cornwall, Engineer, do send greeting.

WHEREAS His most Excellent Majesty King George the Fourth, by His Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the Ninth day of October now last past, did give and grant unto me, the said Thomas Tippett, my executors, administrators, and assigns, during the term of years therein expressed, His special licence, full power, sole privilege and authority, that I, the said Thomas Tippett, my executors, administrators, and assigns, 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, my "IMPROVEMENTS IN THE CONSTRUCTION AND MODE OF WORKING ENGINES WITH STEAM AND AIR, AND IN THE BOILER OR GENERATOR OF STEAM, AND IN THE APPLICATION OF SUCH IMPROVED ENGINES TO A NEW METHOD OF PROPELLING VESSELS AND OTHER FLOATING BODIES;" in which Letters Patent there is contained a proviso obliging me, the said Thomas Tippett, under my hand and seal, to cause a particular description of the nature of my said Invention, and in the manner in which the same is to be performed, and to cause the same to be inrolled in His Majesty's High Court of Chancery within two calendar months next and immediately after the date of the said 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, I, the said Thomas Tippett, do hereby declare that my said improvements in engines to be worked with steam and air or atmospheric pressure, and in the boiler, and in the application of such improved engines, are set forth and explained in the following description thereof, and are also further made manifest by reference to the Drawings hereunto annexed (that is to say):—

I construct my said engine by erecting two working cylinders, (that are furnished with pistons, valves, pipes of communication, and other parts usually employed with the working cylinders of steam engines,) one of which cylinders that has four times the internal capacity of the other is open at one end to the air or atmosphere, while the other smaller cylinder is closed at both ends; and I connect the piston rods of both cylinders with the same end of an engine beam in the usual manner, that of the larger cylinder being farthest from the centre of motion of the said beam; and after blowing out the air from my said cylinders, by the admission of steam from the boiler in the usual manner, I cause the steam to pass from the boiler by a proper tube to the upper internal part of my smaller close cylinder above its piston, and at the same time cause the valves to be opened, which permit steam to pass from the lower part of the said cylinder, and from the lower part of the large open cylinder beneath their pistons through pipes to the condenser, which condenser is formed in the usual manner, by which means an approximation to a vacuum will be formed beneath the said pistons, and the larger piston will be pressed downwards or towards the closed end of its cylinder by the pressure of the atmosphere acting on the side of it that is exposed to the air, while the piston of the smaller cylinder will be also pressed downwards, or in the same direction with the other, at the same time, by the pressure of the steam from the boiler. I then close the communication between the lower extremities of both my cylinders and the condenser by the usual means, and at the same time open a communication through a pipe properly arranged for the purpose between the upper end of my smaller closed cylinder and the lower end of my larger open cylinder beneath its piston, while a communication is likewise opened between the boiler and the lower extremity of my smaller cylinder beneath its piston, the effect of which latter combined operations will be, that the pistons of both cylinders will be forced upwards, the piston of the smaller cylinder, by the force of the steam from the boiler, and the piston of the larger open cylinder by the difference or excess of the pressure of the steam beneath it acting on its larger surface above that of its pressure on the piston of the smaller cylinder in the contrary direction, which latter piston has only a fourth of the area of the other piston, and which excess will be farther aided by the effect of the

steam acting expansively in passing from the upper part of the smaller cylinder to the lower part of the larger open cylinder beneath its piston, an effect well known to experienced engineers, and long since calculated and used by M^r^. James Watt in other modes of application, by which he proved that in some instances a given quantity of dense steam would perform double the work in the same time that it would if employed with an uniform pressure. I use an air pump with my condenser of the common construction; but prefer that its rod should be connected with that part of the engine beam which lies at the opposite side of its centre of motion from that to which the piston rods of the two before described working cylinders are united, and I work, or open and close the valves of my engine as required, and perform all other operations necessary for the engine, by any of the approved means commonly used for such purposes. The connecting rod by which the engine is to be made to operate on a fly wheel or momentum wheel for turning machinery, or on pumps for raising water from mines and other depths, I fasten in the usual manner to the head of the beam that is most remote from the working cylinders, and I continue the working of my engine as long as is necessary, by reiterating the operations already mentioned in the following description.

My improvements on the boiler or generator of steam are effected by placing a semy-cylindrical vessel above and parrallel to a cylindrical boiler, with its flat side downwards, and connecting the two by several vertical tubes, which I prefer arranging in three rows between the top of the cylindrical boiler and the bottom of the semi-cylindrical addition, one of which rows of tubes is to range along the summit of the cylindrical boiler, and the other two rows to be disposed at equal distances from it at its opposite sides. I prefer having the fire-place for my boiler made within my cylindrical boiler in the manner usual for those of this kind, and having an additional smaller preparatory boiler of the same depth as the cylinder and the same breadth, but of very little length, placed upright near the farther end of my cylindrical boiler from its fire-place, and connecting the upper parts of the two together by a horizontal tube. I cause the heated vapours and flame to pass from the aforesaid fire-place through my cylindrical boiler, to impinge or strike against the adjacent end of my preparatory boiler, and then to ascend to the bottom of my semi-cylindrical addition; and after passing along its whole length in a direction contrary to their first progress, I cause them to descend by external flues along the sides of my cylindrical boiler near its front, and then to pass beneath its bottom in their first direction to the lower part of my preparatory boiler, behind which they are again to ascend as far as the top of the semi-cylindrical addition, along whose whole extent they are then to pass to the chimney, which is

erected immediately above the front of the boiler; the flame and hot vapours are made to circulate, as mentioned, by a proper arrangement of the brickwork, in which the whole is enclosed by means sufficiently well known to the erectors of furnaces to need more particular description. The combined boiler thus constructed, is to be supplied with water by a forcing pump worked by the engine, which is to make it by a pipe enter the bottom of the preparatory boiler, from the top of which, after receiving some heat, it will pass into the cylindrical boiler, and from thence will rise up the vertical tubes into the semi-cylindrical addition a sufficient height to admit of a large part of it being heated there, though not so high as to prevent it (the said semi-cylindrical addition) from serving also as a steam reservoir by occupying too much of its interior. By constructing my boiler in this manner, I conceive that I shall be able to heat the water in it much quicker and with less expence of fuel than by a common boiler, on account of the much more extensive surface of water that is in it exposed to the action of the fire.

Lastly, the new method of propelling vessels, to which I apply the power of my new engine herein-before described, is effected, first, by having two or more hollow cylinders placed horizontally within each vessel at its stern beneath the level of the water, with one of the ends of each opening into the water, but properly secured all round so as to prevent any water from running into the vessel between its sides and the planks and timbers of the latter; and in those cylinders I cause pistons to work forwards and backwards by means of cranks or other fit modes of effecting the operation by the primary power of my steam engine, which means or modes are well known to most engineers, regulating the motion, however, in such a manner that the velocity with which the water is driven out backwards from the vessel shall be considerably greater than that with which it enters the cylinders; and I also, secondly, cause strong metallic rods to be moved back and forwards horizontally through stuffing boxes in the stern of the vessel beneath the level of the water, by means similar to those by which the motion of the said pistons is effected above mentioned; and to the outer ends of these rods I attach by proper joints, vanes, or flat plates, capable of shutting close to the rods, or in their line of direction when said rods are drawn inwards, and of opening outwards from the rods again when these are thrust out backwards from the vessel, to a degree not exceeding a position at right angles to the rods, which may be easily effected by stops fastened to the said vanes, or constructed in the joints by which they are attached to the rods; and these vanes, by pressing against the water with their extended surfaces when the rods are driven outwards, will impel the vessel by their reaction, while on the other hand, by being folded up

(1 SHEET)

A.D. 1828. October 9. № 5,714.
TIPPETT'S Specification.

FIG. A.

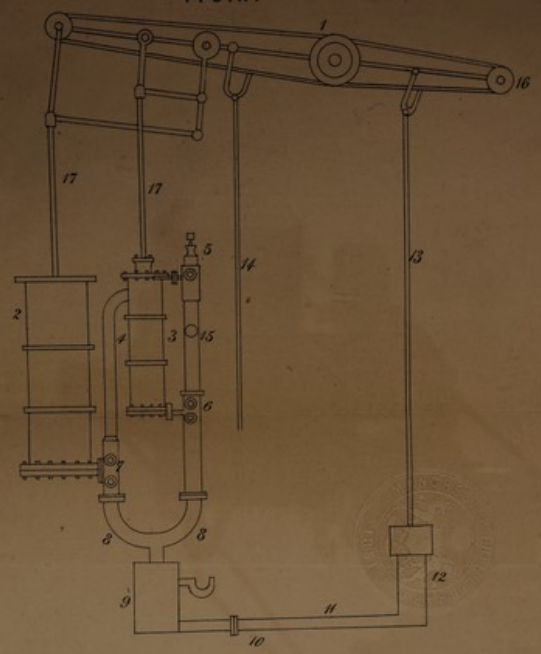

FIG. 6.

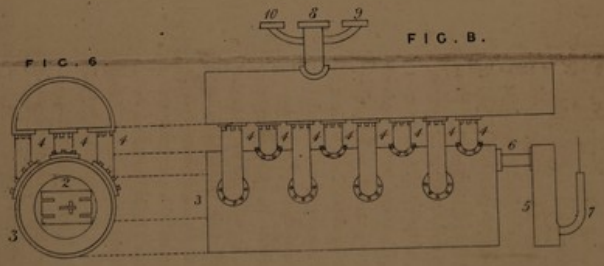

FIG. B.

The enrolled drawing is colored.

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Printers to the Queen's most Excellent Majesty. 1854.

as mentioned, they will present but a comparatively small surface to the water, and thereby make but little resistance to the way of the vessel when they are retracted preparatory to another protrusion.

To farther explain and make more perfectly clear the nature and intent of my before-described improvements, I have annexed Drawings of one of the methods in which my improved engine worked by steam and air or atmospheric pressure is arranged, and also of one of the methods in which my improved boiler or steam generator is formed, according to the foregoing descriptions thereof; and of these Drawings the following is an explanation corresponding to the letters and cyphers of reference added to the various parts.

Figure A is a representation of one of my improved engines worked by steam and air, or atmospheric pressure, in which N° 1 denotes the beam of the engine; N° 2, the larger cylinder, open at its top to the atmosphere; N° 3, the smaller closed cylinder; N° 4, the pipe of communication between the top of the smaller cylinder and the bottom of the larger cylinder; N° 5, the valve box at the upper end of the smaller cylinder; N 6, the valve box at the bottom of the same cylinder; N° 7, the valve box at the bottom of the larger or air cylinder; N^{os} 8, 8, the eduction pipes from both cylinders to the condenser; N° 9, the condenser; N° 10, a pipe leading from the condenser to the air pump; N° 11, a valve in said pipe opening towards the air pump; N° 12, the air pump; N° 13, the pump rod of the air pump; N° 14, the plug rod by which the gear or apparatus for working the valves is moved; N° 15, the orifice for the steam pipe that communicates with the boiler; N° 16, the head of the beam to which a connecting rod is to be attached for turning a fly wheel to work machinery, or for working pumps for raising water from mines or other depths and N^{os}17, 17, the piston rods.

Figure B represents the side of my improved boiler, in which N° 1 denotes the semi-cylindrical steam generator; N° 3, the cylindrical boiler; N^{os} 4, 4, 4, 4, the vertical pipes which connect the cylindrical boiler with the semi-cylindrical steam generator; N° 5, the preparatory or feeding boiler; N° 6, the pipe that connects the preparatory boiler with the cylindrical boiler; N° 7, the feeding pipe of the preparatory boiler; N° 8, the man passage in the boiler; N° 9, the safety valve; N° 10, part of the pipe that leads to the engine.

Figure C is a representation of the front end of the boiler, in which N° 1 denotes the end of the semi-cylindrical steam generator; N° 2, the fire tube that contains the fire-place and ash receptacle; and N^{os} 4, 4, 4, the vertical tubes which connect the cylindrical boiler with the semi-cylindrical steam generator.

Having thus fairly and clearly, to the best of my ability, described my improvements in the construction and mode of working engines with steam and air, and in the boiler or generator of steam, and in the application of such engines to a new method of propelling vessels or floating bodies, according to the proviso aforesaid in the said Patent granted to me, as before set forth, I declare the said foregoing description to be the Specification of my said improvements.

In witness whereof, I have hereunto set my hand and seal, this Fifth day of December, in the year One thousand eight hundred and twenty-eight.

THOMAS (L.S.) TIPPETT.

WINGFIELD.

AND BE IT REMEMBERED, that on the Fifth day of December, in the year of our Lord 1828, the aforesaid Thomas Tippett came before our said Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and everything 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.

Inrolled the Fifth day of December, in the year year of our Lord One thousand eight hundred and twenty-eight.

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