2 Sheets—Sheet 1.

C. TYSON.

Steam-Engine.

No. 220,043. **Patented Sept. 30, 1879.**

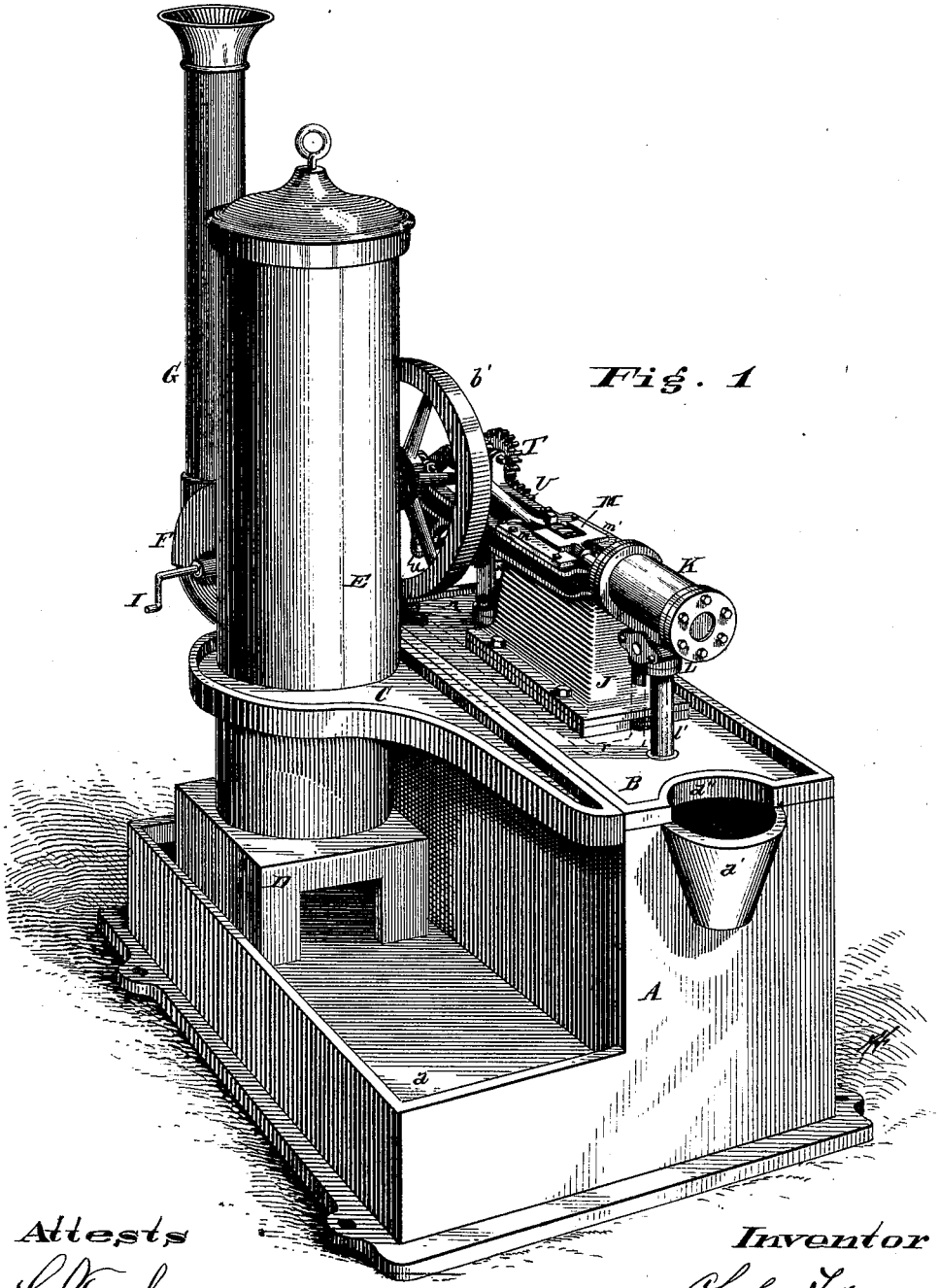

Fig. 1

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by his attorney

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Fig. 2

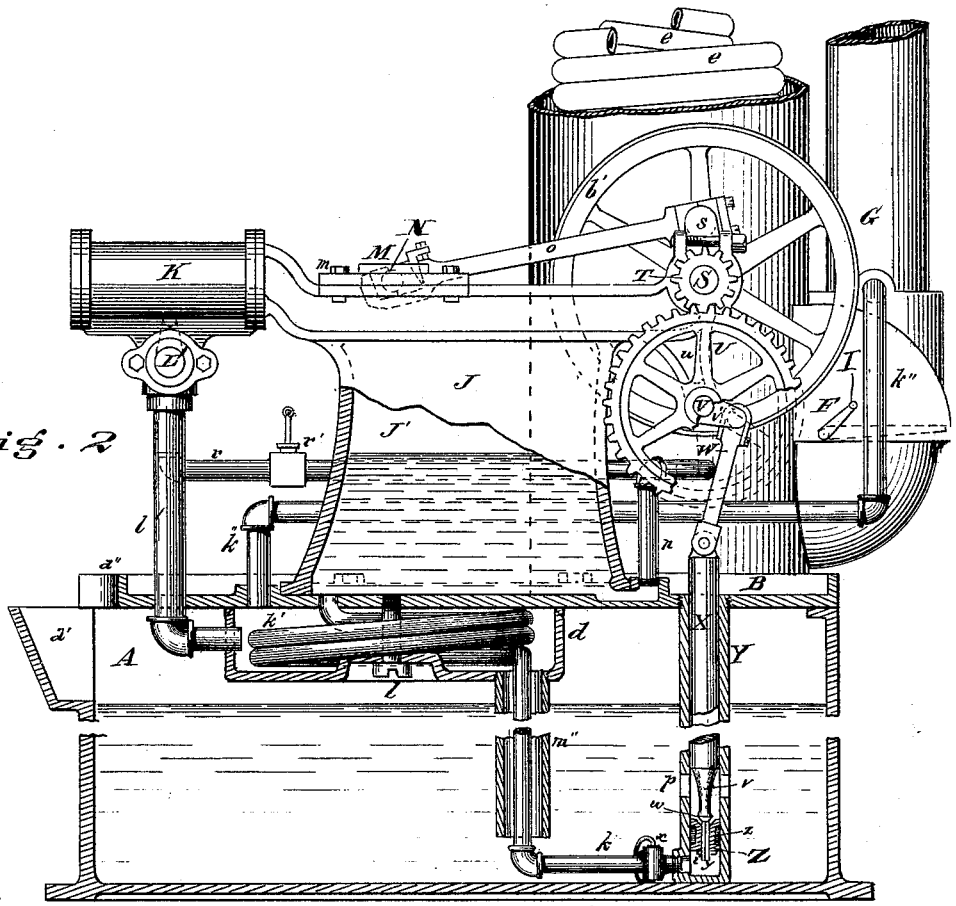


Fig. 3

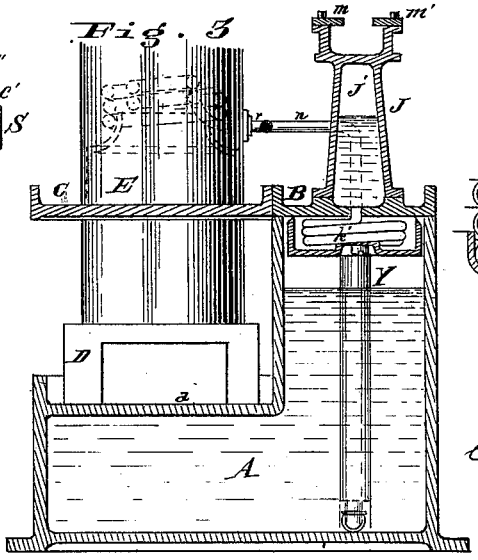


Fig. 5.

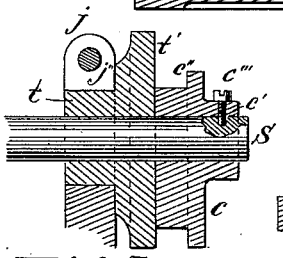
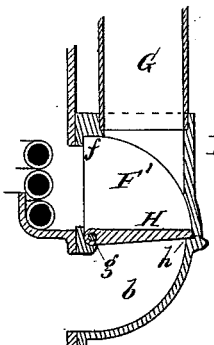


Fig. 4



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Inventor
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UNITED STATES PATENT OFFICE.

CHARLES TYSON, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **220,043**, dated September 30, 1879; application filed February 14, 1879.

To all whom it may concern:

Be it known that I, CHARLES TYSON, of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Steam-Engines, of which the following is a specification.

My invention relates to that class of steam-motors in which the boiler is composed of a coil or coils of pipe which have direct communication with the engine and with the pump by means of an air-chamber. The pressure of the steam in the engine is wholly dependent upon the compression of the air in the air-chamber. This has been clearly set forth in patents granted to me November 6, 1877, and numbered 196,844, and reissued January 29, 1878, and numbered 8,062.

My invention consists in the novel construction of the engine, its connections, and the frame of the entire motor. By having the bed-plate of the engine of such a design that it can act as an air-chamber I save space, and at the same time give greater compactness to the entire machine. I also have the foundation of the engine, boiler, and fire-box made in the form of an L, and in it I hold the feed-water of the boiler. The air-chamber sets directly over the feed-water tank, and hence direct communication between the two is made easy.

My invention has for its object the construction of a motor complete—engine, boiler, and appendages—in the most compact form, to be easily repaired, and at the same time to be cheap in its construction, and thereby to be within the reach of all who need such a motor.

In the accompanying drawings, Figure 1 is a perspective view of the machine embodying my invention. Fig. 2 is a longitudinal view of the motor, part being in elevation and part in section, showing the air-chamber, pump, feed-water tank, and pipe connections. Fig. 3 is a cross-section through the feed-water tank and air-chamber, and showing boiler and pipes in the background. Fig. 4 is a section of the damper in the chimney. Fig. 5 is a section through the shaft-boxes, bearings, and eccentric.

Like letters of reference indicate corresponding portions of the machine.

A is the feed-water tank, and which acts as the main frame of the entire motor. This feed-water tank A has a cover, B, which is secured by means of bolts. The tank A is constructed in the form of an L, and has a floor, *a*, which acts as a support to the fire-box D, which may be moved upon it for cleaning or other purposes.

There is a plate, C, which is firmly secured to the upper part of the tank A. Upon this plate the boiler E rests. The boiler is composed of coils of pipe *e e*. Upon one side of the boiler there is the smoke-flue F. The flue F is composed of two passages, F′ and *b*. In the smoke-flue there is a damper, H, which closes against the seats *h* and *f*, and moves upon an axis at *g*. This damper H may be operated by means of the crank I, which in its turn may be operated by any suitable contrivance which has connection with the engine in such a manner that when the engine is motionless the damper H is against the seat *f*, but upon its being put into motion the damper drops upon the seat *h*.

The object of the above arrangement is that when the engine is in motion, and consequently in need of steam, the flame or products of combustion are forced to pass up among the coils before they can find egress and escape by the chimney G; but when the engine is not in motion the damper rises to the vertical, and the passage *b* is open to the chimney G, and the products of combustion do not pass up among the coils, but pass directly from the fire-box D to the chimney G by means of the passage *b*. By this arrangement the coils are not worn out so soon by oxidation and burning.

The bed-plate J of the engine is secured to the cover B by means of bolts, and the joint between them is perfectly water-tight. This precaution is necessary, as the bed-plate J is also to act as the air-chamber.

K is the cylinder of the engine, and is bolted to the bed-plate J. Steam is allowed entrance to either port by means of an oscillating valve, L′, which is kept in motion by means of an eccentric in the ordinary way.

M is the cross-head of the engine, and runs upon guides *m m′*, which guides are made separate from the bed-plate and can be easily replaced. N is the cross-head pin.

The bed-plate J has the lower part or pedestal made hollow, and when it is bolted down

to the tank-cover B it forms a water-tight air-chamber.

The bed-plate J carries the crank-shaft S upon the end opposite that occupied by the steam-cylinder K, and this shaft is revolved by means of the engine through a connecting-rod, *o*, and crank *s*.

Upon one end of the shaft S is secured the fly-wheel *b'* and the eccentric *c*. The fly-wheel *b'* may be used as a band-wheel. The eccentric is shown in Fig. 5. It may be made of any suitable metal, and is composed of the eccentric strap bearing flange *c''*, and hub *c'*. It is secured to the shaft S by means of the set-screw *c'''*.

The bearing-boxes of the shaft S next to the eccentric have their flanges enlarged, as shown in Fig. 5 at *t'*. This acts as one of the side bearings of the eccentric strap. By this construction I have an eccentric which is easily removable and replaced, and at the same time allows the strap to be made in one piece. The part *t* remains stationary while the eccentric is in motion.

Upon the opposite end of the shaft S is a toothed wheel, T, which gears into another wheel of the same construction, U, only of a very much larger diameter. This wheel U is secured to a shaft, V, which has a crank, *v'*, upon it, and is supported in pendants *u* from the bed-plate J.

The crank *v'* puts in motion the pump-rod X by means of a pitman, W. This pump-rod X is narrowed down, as shown at *v*, and at the bottom of which is a valve, *w*, and winged guide *y*, with a pin, *i*, through it.

The piston Z surrounds the winged guide *y*, and has a seat for the valve *w* at its upper side. It is supplied with packing *z*.

When the pump-rod is ascending the valve *w* is off its seat, and the piston rests upon the pin *i*, and the water passes through the slots *p* in the tube Y and through the opening in the piston which is occupied by the winged guide, and beneath the piston. Now, when the pump-rod X descends, the valve *w* closes the opening through the piston and forces the water through the regulator check-valve *x*, and up the pipe *k* into the coil *k'*, and then into the air-chamber J'. This pump, as just described, was invented by me, and Letters Patent allowed to me on August 24, 1878.

The coil *k'* is inclosed in a metal box, *d*, which is held in its place by the bolt *l*. This coil and box act as the heater to the feed-water as the exhaust-steam from the engine passes through the pipe *l'* into the box *d* and around the coil *k'*.

Around the vertical portion of the pipe *k* there is a tube, *m''*, of a much larger diameter, which acts as a drip-pipe to the heater, and at the same time saves the making of an extra joint in the box *d*.

The object in having the exhaust-pipe directly under the valve and steam-cylinder K is that any water from condensation of steam or priming may have easy egress, and thereby prevent hammering in the cylinder, which would retard the motion of the engine. After the exhaust-steam has passed through the heater-box *d* it can pass out through the pipe *k''* into the smoke-chimney G above the damper H. The feed-water to the boiler passes from the air-chamber J' through the pipe *n*, and, after being converted into steam in the coils, it passes through the pipe *r* into the valve-chest L.

In the steam-pipe *r* there is a governor-valve, *r'*, which may be operated by any of the ordinary methods.

Upon one side of the feed-water tank A there is an opening left by means of the bulge *a'* and the depression *a''*, for the purpose of putting in feed-water without removing the cover B.

All of the parts of the engine in which there is any movement can be easily replaced, thereby making the machine proper very durable. As many of the working parts as possible are turned up in the lathe, which saves considerable in the manufacture of the engine.

The pump-cylinder Y is screwed into cover B, and has no support at the bottom. This makes a cheap pump-cylinder, and renders it readily removable.

I claim—

1. The combination of the tank A, chambered bed-plate J, and boiler E, made of coils *e e*, substantially as and for the purpose specified.

2. The combination of the tank A, provided with a floor, *a*, chambered bed-plate J, boiler E, made of coils *e e*, and fire-box D, substantially as and for the purpose specified.

3. The combination of the tank A, chambered bed-plate J, supporting an engine, boiler E, made of coils *e e*, fire-box D, and damper H, which is so arranged that it does not prevent some heat from getting to the coils *e e*, but prevents sufficient to generate steam enough to run the engine, all constructed substantially as and for the purpose specified.

4. The combination of the feed-pump, composed of parts X, *v*, *w*, *y*, *i*, Z, *z*, Y, and *p*, tank A, heater-coil *k'*, chambered bed-plate J, boiler E, made of coils, and damper H, constructed substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

CHARLES TYSON.

Witnesses:
R. M. HUNTER,
CHAS. F. VAN HORN.