

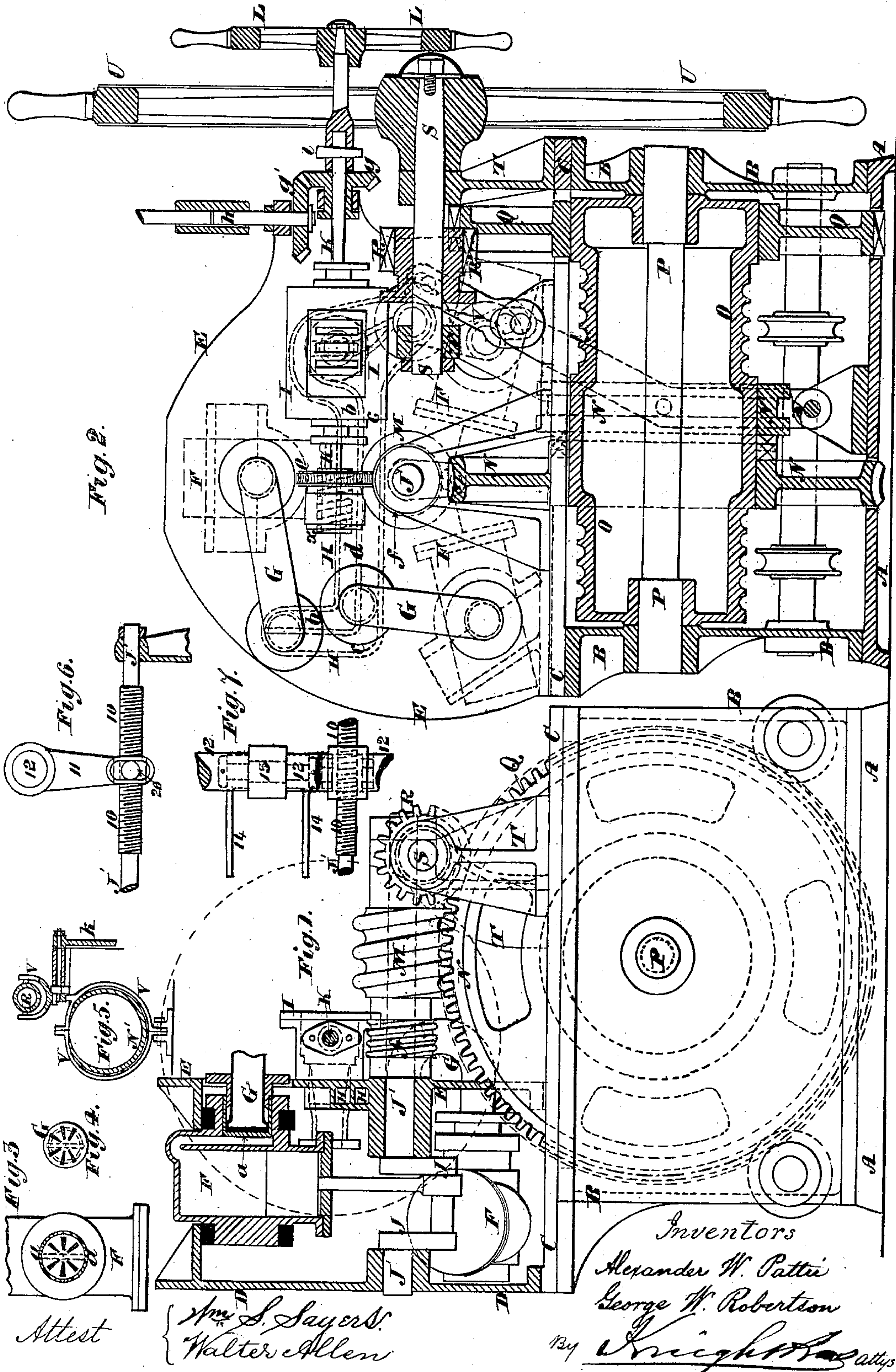
(No Model.)

A. W. PATTIE & G. W. ROBERTSON.

STEAM AND HAND STEERING ENGINE.

No. 267,580.

Patented Nov. 14, 1882.



UNITED STATES PATENT OFFICE.

ALEXANDER W. PATTIE AND GEORGE W. ROBERTSON, OF GLASGOW, COUNTY OF LANARK, SCOTLAND; SAID PATTIE ASSIGNOR TO SAID ROBERTSON.

STEAM AND HAND STEERING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 267,580, dated November 14, 1882.

Application filed July 8, 1882. (No model.) Patented in England May 23, 1882, No. 2,424.

To all whom it may concern:

Be it known that we, ALEXANDER WATSON PATTIE and GEORGE WASHINGTON ROBERTSON, subjects of the Queen of Great Britain, and residents of Glasgow, Scotland, have invented a new and useful Improvement in Combined Hand and Steam Steering-Engines, of which the following is a specification.

Our invention relates to improvements in combined steam and hand steering-engines, parts of the said improvements being also applicable to the starting, stopping, and reversing of marine and other engines.

In order that our invention may be fully understood, we will proceed to describe it with reference to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a partial vertical section and a partial side elevation of our improved engine. Fig. 2 is a partial transverse section and a partial side elevation of the same. Figs. 3, 4, 5, 6, and 7 are detail views of parts of our improved mechanism.

The apparatus consists of a sole-plate, A, bolted to the ship's deck and carrying two vertical frames, B, on which an entablature, C, is secured, two other vertical frames, D E, being bolted to the entablature at and near one of its ends. Between the frames D E three oscillating cylinders, F, are carried, these cylinders having their pistons all connected to one crank, J, and being each formed with trunnions moving in bearings between the frames D E. One of the trunnions of each cylinder is constructed hollow, and it is connected by a steam-pipe, G, and steam-passages H with a valve-chest, I, wherein a common slide-valve is situated. The steam-pipes G are each divided into two channels by a diaphragm or web extending throughout the entire length of the pipe, and the inner end of the pipe, where it is connected to the trunnion, is closed and situated in a pocket, a, so as to bear against the bottom or end thereof, such pocket being preferably made of steel and inserted into the hollow trunnion. In the bearing-surfaces of the pocket a and pipe G valve-openings are cut—six in number—such openings being preferably arranged three on each side of the longitudinal diaphragm of the pipe, as shown in Figs. 3 and 4. When the connection is being made, the oscillating cyl-

inders are put into their central position and the pipes G and pockets a, with their valve-openings in closed position, are inserted at one and the same time into the trunnion, after which the pocket is secured, so as to oscillate with the trunnion by a pin or key. Any difficulty which might otherwise arise in setting the pipe and pocket with the valve-openings in proper position relatively to the position of the cylinder and crank is by this means obviated. The other ends of the pipes G are connected with the steam-passages H, which are cast in the frame E, and communicate with the ports of the slide-valve chest I. The passages H are also divided into two channels, b c, by a midrib or web, d, and the channel b communicates with the channel on one side of the diaphragm in each pipe G, while the channel c communicates with the channel on the other side of said diaphragm—that is to say, while the engine is being operated in one direction steam is admitted to each of the three cylinders through the channel b and exhausted through the channel c, while, when the engine is operated in the reverse direction, steam is admitted to the cylinders through the channel c and exhausted through the channel b.

The slide-valve spindle K passes through both ends of the valve-chest I, and on one end of the spindle a hand-wheel, L, is secured, while a screw-thread, k, is formed on the opposite end of said spindle. This screw-thread works through a correspondingly threaded boss or hub of a worm-wheel, e, carried in a bracket on the frame E and geared with a worm-screw, f, formed upon or secured on the crank-shaft J'. Thus when the hand-wheel L is rotated in one direction the internally-screwed worm-wheel e, which is then stationary, acts as a nut on the screwed part of the valve-spindle K, thereby drawing the slide-valve in one direction and admitting steam to the cylinders alternately. This being effected, the steam is immediately cut off again by the worm-screw f on the crank-shaft J', which, in rotating, turns the worm-wheel e, and so reciprocates the spindle K and its slide-valve in the opposite direction. A repetition of these movements takes place until the helm has been brought into the position desired by the steersman.

To connect the engine to the steering apparatus another worm-screw, M, is secured on the crank-shank J' and geared with a worm-wheel, N, centered loosely on a barrel, O, which is carried on a shaft, P, supported in the lower vertical frames, B. The barrel is grooved on each side of the wheel N to receive the chains or ropes connecting the steering apparatus with the helm, and the wheel N is geared with the barrel, when desired, by a clutch, N', which slides on a feather in the barrel.

To enable the steering-engine to be actuated from the bridge, as well as from the deck or pilot-house, a bevel-wheel, g, is keyed on the valve-spindle K and geared with a similar wheel on the lower end of a vertical spindle, h, which communicates with the bridge steering-gear. The spindle h is made in two parts, connected together, when steering from the bridge, by a sliding collar and feather or by equivalent means. When steering from the bridge or when steering by hand from the deck or pilot-house, the steam steering-wheel L is disconnected from the valve-spindle K by withdrawing the key or pin i, or by any other convenient means.

To adapt the apparatus for steering by hand—that is to say, without steam—a spur-wheel, Q, is keyed upon the barrel O. This wheel is geared with a pinion, R, centered on a shaft, S, supported in brackets T on the entablature C, the said shaft S having a hand-wheel, U, secured on one of its ends. The pinion R is connected to the shaft S by a feather, and it is thrown into and out of gear with the wheel Q by a strap, V, which is so coupled with the pinion R and with the clutch N' of the worm-wheel N that when the apparatus for steering by steam is thrown out of gear the apparatus for steering by hand is simultaneously thrown into gear with the barrel O, and vice versa. As shown in Fig. 5 of the drawings, the strap V is operated by the hand-lever k, on the inner end of which a crank is situated, acting in a slot in the strap, or a quadrant or other equivalent device.

In adapting the apparatus to the starting, stopping, and reversing of motive-power engines other than steering-engines the barrel O and the apparatus by which it is actuated from the engine, when steering by hand, are dispensed with, and a screw, 10, is formed on the crank-shaft J', as seen in Figs. 6 and 7. On the screw 10 a nut, 20, is placed, which is connected to a lever, 11, centered on a weigh-shaft, 12, on which latter another lever, 13, is centered, to the lower end of which drag-links 14 are connected, said links being also connected to a quadrant which operates the steam-distributing valve of the high-pressure cylinder

in the manner well understood and practiced. A similar arrangement of lever and links is also employed to actuate the steam-distributing valve of the low-pressure cylinder, or, as an alternative, the screw 10 may be geared with a toothed quadrant or with a wheel; or it may be otherwise connected to the valve-spindles of the main engine, it being understood that we do not restrict ourselves to any precise method of connecting the starting, stopping, and reversing engine to the valve-spindles of the main engine, as such connection may be effected in various ways.

We are aware that steam steering-engines have been made with three oscillating cylinders. Therefore we do not claim broadly such arrangement; but,

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. In a combined steam and hand steering-engine, the combination of three cylinders oscillating on trunnions at their centers and provided with pipes for the induction and exhaust of steam to and from the said cylinders, such pipes being each provided with a web, by which its interior is divided into two channels for the purpose specified, and each of said pipes being provided with a pocket at the point of connection with the cylinder, said pocket being inserted into the hollow trunnion, and the pocket and pipe having valve-openings in their bearing-surfaces, substantially as and for the purposes set forth.

2. In a combined steam and hand steering-engine, the combination of the slide-valve spindle K, having the slide-valve, the wheel L, and screw x, all attached to the said spindle, and the crank-shaft J', with the internally-screw-threaded worm-wheel e, and worm f, whereby steam is alternately admitted to and exhausted from the cylinders, substantially as and for the purposes specified.

3. In a combined hand and steam steering-engine, the combination of the chain-barrel O, worm M, worm-wheel N, clutch N', and strap or lever V, with the spur-gearing Q, shaft S, wheel R, and hand-wheel U, as and for the purposes shown and described.

In testimony whereof we, the said ALEXANDER WATSON PATTIE and GEORGE WASHINGTON ROBERTSON, have affixed our signatures, in presence of two witnesses, this 16th day of June, A. D. 1882.

ALEXANDER WATSON PATTIE.

GEORGE WASHINGTON ROBERTSON.

Witnesses:

GEORGE MACAULAY CRUIKSHANK,

J. J. H. CRUIKSHANK,

Both of 135 Buchanan Street, Glasgow.