

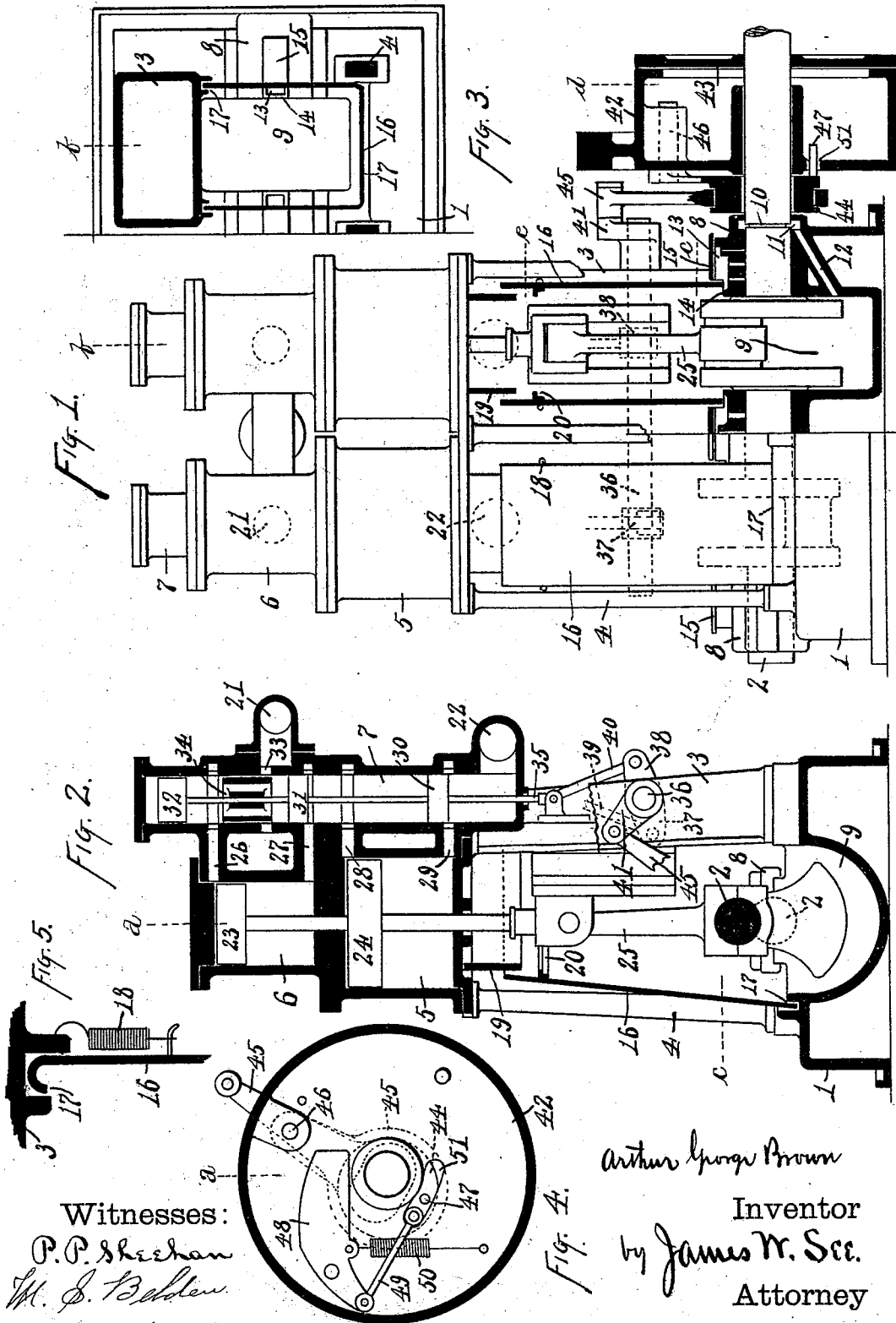
(No Model.)

2 Sheets—Sheet I.

A. G. BROWN.
STEAM ENGINE.

No. 514,700.

Patented Feb. 13, 1894.



Witnesses:

P. P. Sheehan
M. S. Belden

Arthur George Brown

Inventor
by James W. See.
Attorney

(No Model.)

2 Sheets—Sheet 2.

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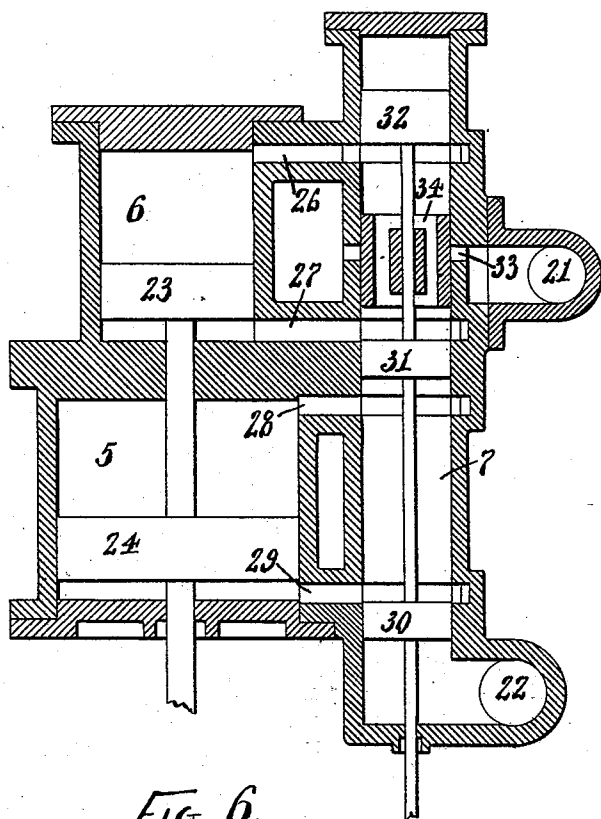


Fig. 6.

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Attorney

UNITED STATES PATENT OFFICE.

ARTHUR GEORGE BROWN, OF BOLTON, ENGLAND.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 514,700, dated February 13, 1894.

Application filed May 15, 1893. Serial No. 474,176. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR GEORGE BROWN, a citizen of the United States, residing at Bolton, county of Lancaster, England, have invented certain new and useful Improvements in Steam-Engines, (Case A,) of which the following is a specification.

This invention pertains to improvements in steam engines, which improvements will be readily understood from the following description taken in connection with the accompanying drawings in which—

Figure 1, is a front elevation of an engine exemplifying my present improvements, parts appearing in vertical section in the plane of line "a" of Figs. 2 and 4; Fig. 2, a vertical section of the same in the plane of line "b" of Figs. 1 and 3; Fig. 3, a horizontal section in the plane of line "c" of Figs. 1 and 2; Fig. 4, a vertical section in the plane of line "d" of Fig. 1; Fig. 5, a horizontal section in the plane of line "e" of Fig. 1; and Fig. 6 a vertical section of cylinder and steam chest, similar to Fig. 2, but showing the pistons just rising and the valves in appropriate position.

I illustrate my improvements in connection with a double engine, that is, two engines operating on one shaft with cranks set opposite, and in the description the details will be mainly limited to one engine, it being understood that the other engine is a duplicate of it.

In the drawings:—1, indicates the bed-plate: 2, the crank-shaft, having two cranks set opposite: 3, back-frames extending up from the bed-plate to support the cylinders: 4, front columns extending up from the bed-plate to support the front of the cylinders: 5, low pressure cylinder: 6, high pressure cylinder, tandem to and above the low pressure cylinder: 7, cylindrical steam chest common to both cylinders: 8, pillow-block caps: 9, oil pits in the bed-plate into which the cranks dip: 10, a circumferential groove in the crank shaft just within the outer end of the outer pillow blocks: 11, circumferential chambers in the pillow-blocks around outside of grooves: 12, a channel in the bed-plate leading from the base of chamber 11 into oil pit 9: 13, open top oil chamber in the pillow-block cap: 14, the inner margin of this oil chamber, that margin nearest the crank, this margin being lower than the general margins of the

oil chamber and forming a low inner overflow wall for the oil chamber: 15, cover plate for the oil chamber, resting upon the higher portions of the walls thereof: 16, a removable casing of sheet metal with its rear edges seated in grooves in the front of the back-frame, and with its lower edge resting in grooves in the bed-plate, the sides of this casing passing across the oil chambers 13 in planes outwardly beyond the over-flow wall 14, so that an open portion of the oil chambers is exposed within the sheet metal casing: 17, the grooves in bed-plate and back-frame in which the edges of the sheet metal casing are seated: 18, spring hooks engaging the casing and groove-walls to retain the casing in place: 19, a short casing of similar construction secured to the lower cylinder head and forming a short nozzle reaching from the cylinder head downward a short distance into the top of lower casing 16, casing 16 not extending clear up to the cylinder head: 20, a ledge projecting inwardly from casing 16, near its top, but below the lower edge of casing 19: 21, steam inlet to the steam chest: 22, exhaust outlet from the steam chest: 23, high pressure piston: 24, low pressure piston: 25, connecting-rod: 26, port from steam chest to top of high pressure cylinder: 27, port from steam chest to bottom of high pressure cylinder: 28, port from steam chest to top of low pressure cylinder: 29, port from steam chest to bottom of low pressure cylinder: 30, a valve piston in the steam chest, working over port 29 so as to pass above or below that port: 31, a valve piston working over port 27 so as to pass above or below that port: 32, valve piston in the upper portion of the steam chest, to counter-balance the pressures acting on the valve-pistons: 33, port from steam inlet 21 to steam chest: 34, valve-piston, hollow so steam can pass through it, working over port 23 and serving to cover and uncover that port: 35, valve stem uniting the valve-pistons: 36, rock-shaft journaled in the back-frames: 37, forwardly projecting arm on the rock-shaft, under the steam-chest of one of the engines: 38, rearwardly projecting arm on the rock-shaft, under the other steam chest: 39, link connecting arm 37 with the valve stem of the engine which it is to operate: 40, link connecting arm 38 with the valve-stem which it is to operate:

41, a third arm on the rock-shaft: 42, a drum fast on the crank-shaft to serve as a governor casing and to serve also, if desired, as a pulley and fly wheel: 43, removable oil-tight cover closing the face of the drum: 44, eccentric, having an arm pivoted to the drum 42, and slotted so that the eccentric may swing across the shaft: 45, eccentric strap and rod, connected with rock-shaft arm 41, so that as the eccentric turns the shaft is oscillated, moving arms 37 and 38 up and down, one going up as the other goes down: 46, the pivot which unites the eccentric to drum 42, being the pivot on which the eccentric swings as it is adjusted across the shaft to alter its throw: 47, pins projecting from the eccentric into the drum 42 through a slot in the inner wall thereof: 48, exemplifying governor weight, pivoted within the drum, there being preferably two of these weights as usual in governors of this class: 49, link, within the drum, connecting weight 48 with one of the pins 47, whereby the movement of the weight upon its pivot, effects the adjustment of the eccentric across the shaft: 50, spring forming the centripetal agent of the governor: and 51, the slot in the inner wall of the governor drum through which the pins 47 project.

It will be noticed that the engine consists of two tandem compound engines acting on oppositely set cranks. These engines are single acting, steam acting on the upper surface only of the pistons, and the arrangement is obviously such as to produce proper balancing.

Oil in the oil pit 9 is dipped into by the crank and the sheet metal casings prevent the throwing out of the oil. As the oil is splashed upwardly it is deflected by the casings inwardly onto the parts to be lubricated. Ledges 20 prevent oil splashing up out of the top of the lower casing. Oil may be applied in the oil chambers of the pillow-block caps as usual, and finds its way as usual to the journals. Oil splashed up against the inner surface of the sides of the lower casing flows down to the oil chambers in pillow block caps and surplus oil flows over the low margin 14 again into the oil pit. The edges of the sheet metal casings may be stiffened by a curl or bead as indicated in Fig. 5. Where the edges of these casings fit in the grooves 17 the grooves serve to retain the casings in proper position and at the same time the grooves accumulate and retain oil and thus form a practically tight joint or seal. The casings are readily removable. Oil flowing outwardly along the main journals of the crank-shaft reaches groove 10 and is thrown outwardly by centrifugal force into surrounding chambers 11 from which it flows back into the oil pit, outward passage of oil being thus prevented. The governor drum is practically oil-tight and may be freely charged with oil to lubricate the parts within it.

Steam distribution will now be described

by reference to Fig. 2. Piston 34 is just rising and beginning to uncover port 33. This will permit live steam to pass to the top of piston 23, pressing that piston down. As that piston moves down the steam below it passes into the steam chest and then through port 28 and acts on top of piston 24. At the same time steam from under piston 24 passes out through port 29 and to the exhaust 22. When the pistons have completed their down stroke the valve-pistons descend, valve-piston 34 closing port 33, and valve-piston 30 passing below port 29, under which conditions both the live steam and exhaust connections are both cut off completely from the steam-chest. At the same time valve-piston 31 has passed below port 27. Fig. 6 illustrates the position of the valves when the main pistons have just begun their up stroke. Under these conditions ports 26 and 27 are in free communication with each other through the steam chest, thus permitting steam to pass from above piston 23 to below it, and ports 28 and 29 are in free communication with each other through the steam chest, thus permitting steam from above piston 24 to pass below it. Under these conditions, with both engine pistons in equilibrium of pressure within their respective cylinders, the engine makes its up stroke, the steam being simply transferred from the top to the bottom of the cylinders. On the next down stroke live steam goes above the small piston, and steam under the small piston acts on top of the large piston, and steam under the large piston is exhausted, as before indicated.

I claim as my invention—

1. The combination, substantially as set forth, of a high and low pressure cylinder disposed tandem, a steam chest for the two cylinders in common and provided with steam inlet and exhaust connections and with ports communicating with each end of both cylinders, a hollow piston valve in said steam chest to cover and uncover the steam inlet thereto, a second piston-valve working over the steam port for the bottom of the high-pressure cylinder so as to open that port to the steam chest either above or below that second valve, a similarly arranged third piston-valve for the port of the bottom of the low-pressure cylinder, a valve-stem connecting said piston-valves, and valve-gear for operating the valve-pistons.

2. The combination, substantially as set forth, of a bed-plate provided with an oil-pit, a crank-shaft journaled in said bed-plate with its crank dipping in said oil-pit, a steam cylinder disposed a distance above said oil-pit, rigid supports extending from the bed-plate to the cylinder, a piston in said cylinder connected with said crank, and a removable casing resting upon said bed-plate and extending upwardly to near said cylinder and separable from said bed-plate and supports.

3. The combination, substantially as set

forth, of a bed-plate provided with an oil-pit, a crank-shaft journaled in said bed-plate with its crank dipping in said oil-pit, a steam cylinder disposed a distance above said oil-pit, a piston in said cylinder connected with said crank, a removable casing resting upon said bed-plate and extending upwardly to near said cylinder, deflecting ledges projecting inwardly from the upper portion of the walls of said casing and rigid supports extending from the bed-plate to the cylinder independent of said casing.

4. The combination, substantially as set forth, of a bed-plate provided with an oil-pit, a crank-shaft journaled in said bed-plate with its crank dipping in said oil-pit, a steam cylinder supported over said oil-pit, a piston in said cylinder connected with said crank, a movable casing resting upon said bed-plate and extending upwardly to near said cylinder, and a casing-nozzle projecting from the lower head of said cylinder downwardly into the upper end of said casing.

5. The combination, substantially as set forth, of a bed-plate, a crank-shaft journaled therein, a back-frame rising from the bed-plate, a cylinder at the top of the back-frame, and a three-walled movable casing with its base resting on the bed-plate and its rear edges engaging the back-frame.

6. The combination, substantially as set forth, of a bed-plate provided with an oil-pit

having an upwardly open marginal groove, a crank-shaft journaled in said bed-plate with its crank dipping in said oil-pit, a steam cylinder disposed a distance above said oil-pit, a piston in said cylinder connected with said crank, a removable casing resting its base in said groove and reaching upwardly toward said cylinder and rigid supports extending from the bed-plate to the cylinder independent of said casing.

7. The combination, substantially as set forth, of a bed-plate, a crank-shaft journaled therein, a cylinder supported over the bed-plate, a removable casing extending from the bed-plate up to near the cylinder, and spring-hooks for securing the casing in place.

8. The combination, substantially as set forth, of a bed-plate provided with an oil-pit and with bearings for a crank-shaft having oil-chambers in their tops with lowered overflow ledges toward and discharging to said oil-pit, a crank-shaft journaled in said bearings with its crank dipping in said oil-pit, and a removable casing with its walls rising from said oil-chambers outwardly beyond said overflow ledges whereby oil may flow down the inner side of the casing and supply said oil-chambers and overflow into the oil-pit.

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Witnesses:

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CHAS. GROUNDWATER.