

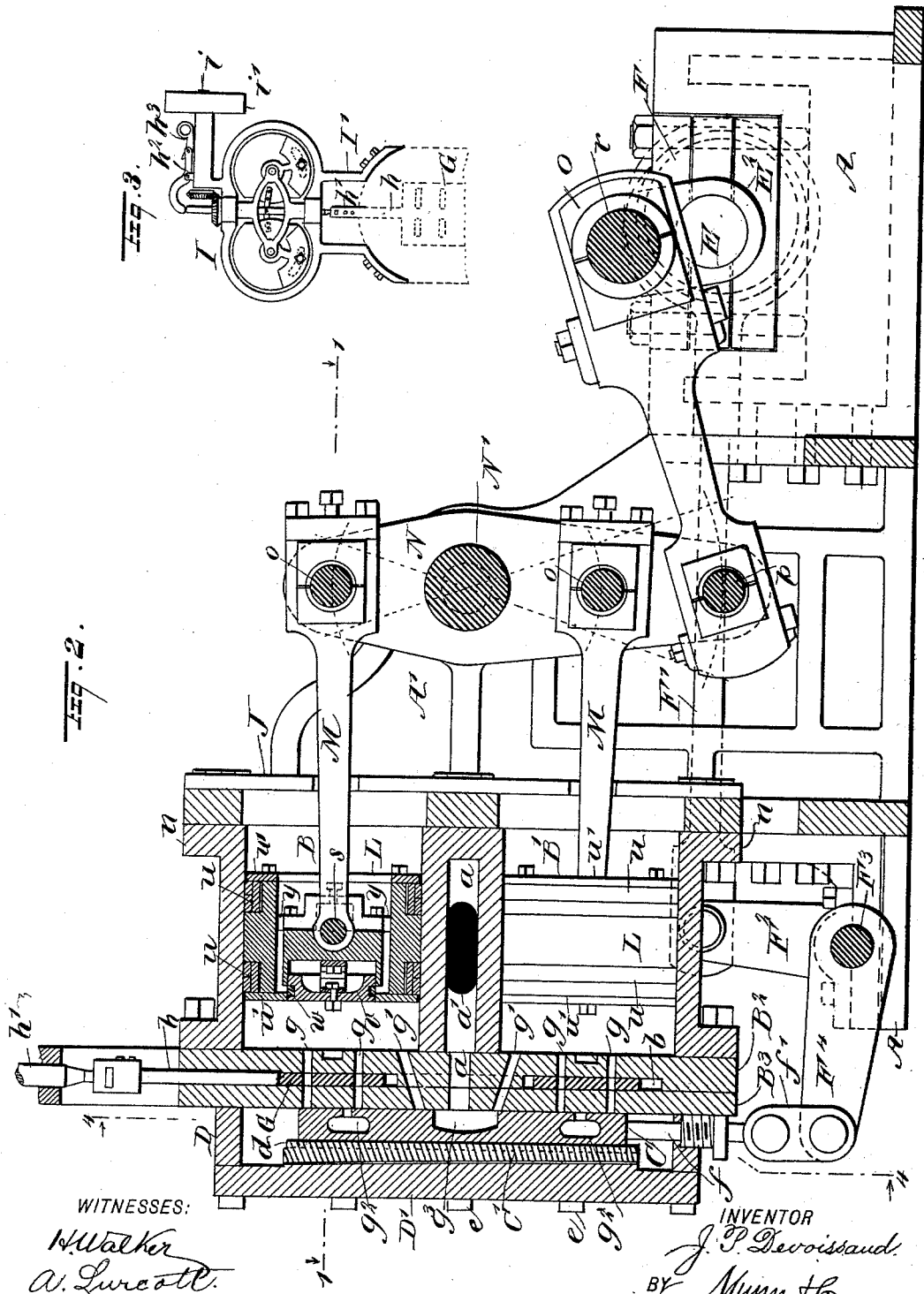
(No Model.)

3 Sheets—Sheet 2.

J. P. DEVOISSAUD. QUICK SPEED STEAM ENGINE.

No. 519,943.

Patented May 15, 1894.



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JOHN P. DEVOISSAUD, OF SHERMAN, TEXAS.

QUICK-SPEED STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 519,943, dated May 15, 1894.

Application filed September 16, 1893. Serial No. 485,648. (No model.)

To all whom it may concern:

Be it known that I, JOHN P. DEVOISSAUD, of Sherman, in the county of Grayson and State of Texas, have invented a new and useful Improved Quick-Speed Steam-Engine, of which the following is a full, clear, and exact description.

My invention relates to improvements in quick speed steam-engines of the high pressure type; and has for its object, to produce a novel, simple and efficient device of the type indicated, which will be adapted to develop a maximum degree of power with an economical expenditure of steam.

To this end, my invention consists in the construction and combination of parts, as is hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly sectional plan view of the improved engine, on the line 1—1 in Fig. 2. Fig. 2 is a longitudinal sectional view on the line 2—2 in Fig. 1. Fig. 3 is a detached side view of a cut-off valve governor, that is preferably used in conjunction with the improvement. Fig. 4 is a transverse sectional view, on the line 4—4 in Fig. 2; and Fig. 5 is a detached side view of the cut-off valve, which is a part of the improvement.

The improved high pressure steam engine is of the horizontal kind, and is provided with an elongated bed plate A, of T-form, the transverse member of which is at the rear end of the engine. The bed-plate A is a box-like structure, of a suitable area and height to suit the dimensions of other parts supported thereon, and afford room for their proper location and effective operation.

To carry into effect the novel and advantageous features pertaining to the improvement, two steam cylinders B, B', are provided, which are forwardly located on the bed-plate A, and thereto secured, one cylinder B, being placed upon the other, so that the axes of their bores will lie in the same vertical plane, and occupy parallel horizontal planes, as shown in Fig. 2. The cylinders are of equal diameter, and have such an equal proportionate length as will permit a proper travel of their pistons. Preferably the cylinders B,

B', are integrally formed; and have an exhaust passage *a*, that is common to both, produced in the wall that divides them. The vertically aligned front ends of the cylinders have suitable circumferential flanges formed on them to receive bolts that serve to secure the oblong head-plate B², upon said ends, steam-tight. The head-plate B², is vertically channeled on its outer face at the transverse center, from a point at a proper distance from the lower end of the same, which channel *b*, is rendered flat and true on its bottom surface, and has parallel sides, its depth being sufficient to adapt it to receive a flat thin throttle valve G, that will be described in its proper order. Upon the exterior surface of the head-plate B², a plate containing the main valve seat B³, is affixed by any preferred means, the main valve C, for steam that enters each cylinder being fitted to slide on this seat within the steam chest D, that is rectangular in form, of proper dimensions to permit a correct movement of the main valve, and is formed in one piece with the valve seat B³ and flanges.

The lid D', of the chest D, has a downwardly and rearwardly sloping projection produced on its inner face, against which the wedge-shaped presser block C', is caused to impinge, which block is provided with a longitudinally extending transversely central tongue *d*, on its side that is nearest to the main valve, said tongue having a loose engagement with a mating groove formed in the back of the valve C, the adjustable attachment of the block C', upon the lid of the steam chest being effected by the bolts *e*, whereby the valve C is maintained at all times in loose contact with the seat B³.

Upon the rear of the bed-plate A, the main shaft E, is supported to revolve by its engagement with the pedestal boxes E', that are saddled upon webbed portions of the bed-plate, as indicated in Figs. 1 and 2, and on one end portion of the shaft an eccentric F, of ordinary form is mounted and secured, its straps having an adjustable connection with the rod F', that extends forwardly to have its front end pivotally joined to the upper end of the upright rock arm F², which is secured on the transversely extended rock shaft F³, that is journaled on the bed-plate below the cylinders. Near the longitudinal center of the

rock shaft F^3 , another rock arm F^4 is affixed on it, that projects forwardly at a right angle to the arm F^2 , and has a linked connection f' formed between its forward end and the rod f of the main valve C.

The valve seat B^3 and head-plate B^2 , are oppositely slotted at two points near each end, thereby providing two live steam ports g , that in pairs intersect the bore of each cylinder B, B' , at points equally removed from its longitudinal axis, each live steam port being bisected by a central bar, as shown in Fig. 4. At two points equally distant from the nearest live steam ports, two similar exhaust ports g' are formed, that extend from near the side walls of the cylinders, through the head-plate B^2 and valve seat B^3 , and are preferably inclined toward the common exhaust port a , where it extends through the head-plate and valve seat, as shown in Fig. 2.

To adapt the main valve C, to pass live steam into the cylinders B, B' , it has transverse ducts g^2 , formed in it at a suitable distance from its ends, and from each of said lateral steam passages in the valve, a transverse slot or extension is produced in the body of the valve that cuts through the valve face at a point between the paired inlet ports g , of each cylinder.

At the longitudinal center of the main valve C, an exhaust cavity g^3 , is formed in it of such dimensions as will permit it to cover or inclose the end of one of the exhaust ports g and the common exhaust passage a , the latter being transversely prolonged as shown at a' in Fig. 2, so that when the main valve is moved into a proper position, the cavity g^3 will place one of the ports g' and the passage a in communication, and exhaust steam that is in the cylinder thus tapped, will have free exit afforded.

The plate-like throttle valve G before mentioned, occupies the channel b that is produced in the head-plate B^2 and has live steam ports cut through it, coinciding with the similar ports in the head-plate and main valve seat or plate between which the throttle valve fits steam tight but free to travel endwise, the center of the valve G, being apertured to afford one large exhaust port g^4 . A flat stem h , is projected from the upper end of the throttle valve, and at its upper terminal is detachably connected to a governor I, that is mounted upon the bracket frame I' , which is saddled upon the top of the cylinder B, at a point which will permit the vertical valve stem h , to be secured to the lower end of the vertical spindle h' of the governor, as indicated in Figs. 2 and 3.

The governor I, preferably used in connection with the variable pressure regulator valve, is of novel construction, and as it forms the subject matter of a separate application, it is not deemed necessary to give a detailed description here. Briefly considered, the governor consists of two flat disks centrally pivoted between laterally projected arms that are

centrally mounted upon the bracket frame I' , each disk having a loose connection established between its edge that is nearest to the upright spindle h' , whereby the rocking movement of the disks on their pivot centers will longitudinally move the spindle h' in unison with the degree of oscillation given to the disks. Each governor disk is furnished with an adjustable weight that is arc-shaped, and is marginally located thereon, but has an arm extended from its inner edge to have a loose engagement with the pivot of the disk whereon the weight is placed. So that the rotation of the shaft h' , by the bevel gearing shown in Fig. 3, and a journaled shaft i , which supports one bevel gear wheel, will cause the valve G to be moved when the speed of the engine varies from the normal rate; motion from the main shaft E, being transmitted to the governor by a belt (not shown) that connects the pulley i , with a pulley m , on the main shaft.

The rear ends of the cylinders are closed by the swinging doors J, that are provided to exclude dirt from the bores of the cylinders at their practically open rear ends, the flange n , that is formed on the exterior of the latter, affording means for a stable connection of the cylinders to the bed-plate which is upwardly extended as housing frames A' , on each side of the cylinders, the doors J being hinged upon said frames as indicated in Figs. 1 and 2.

The similar piston heads L, are of the bucket type, each piston head being jointed at its center to one end of a connecting rod M, which rods have a like formation and are journaled upon the vibratory frame N. The frame N, comprises two similar beams, that are proportioned in length to suit the dimensions of other parts of the engine, and at a correct distance from their upper ends said beams are secured upon a transverse shaft N' , in parallel planes and properly spaced apart to admit the adjacent ends of the rods M between them, for a loose connection with the transverse journal pins o , that are secured in perforations of the beams at an equal distance from the axis of the shaft N' . The side beams of the vibratory frame N, are extended below the lower journal pins o , sufficiently to permit another journal pin p , to be secured in transversely aligned perforations produced in the beams, at a point so removed from the center of vibratory motion in the frame N, that the rocking traverse of the pin p will be equal to double the stroke of the pistons in the twin engine cylinders, as represented by the diagram of motion indicated by dotted lines in Fig. 2.

The main shaft E, is double-cranked at its longitudinal center, which cranks E^2 are joined by a journal pin r , that receives one end of the pitman O, the forward end of the pitman being secured in the usual manner upon the journal pin p . For efficient action, the length of the cranks E^2 from center to center, should exactly equal the distance

traversed by each piston in making a stroke of either of the connecting rods M, or one half the arc of vibration given to the beams of the frame N, at the journal pin *p*.

5 It is also essential for the efficient working of the engine, that the distance between the center of the shaft N', and pins *o* on the frame N, should exceed the throw of the double crank E², which will afford leverage 10 that will conduce to the effective operation of the device as an entirety.

To permit a free movement of the connecting rods M, vertically elongated apertures are formed in the folding doors J where they 15 join, so that the rods may freely travel and vertically vibrate a sufficient degree, without frictionally impinging the doors.

Each of the piston heads L, as shown in section in Fig. 2, consists of a cylindrical 20 spider that is transversely slotted to admit the end of one of the connecting rods M, for a journaled engagement with a wrist pin *s*, that is inserted as shown in the figure mentioned.

25 The usual elastic packing rings *u*, are provided, which are retained in peripheral rabbets formed for their reception on the spider by the annular follower plates *u'*, that are affixed upon the ends of the spider by bolts 30 or other means.

A cylindrical chamber is forwardly formed in the spider of the piston head for the introduction of a neatly fitted cushion block *v*, that is cylindrical externally considered, and 35 is cupped on its inner end to form space for an elliptical spring *v'*, which is secured to the spider and block, its expansive force serving to maintain the cushion block protected to align its outer face with the outer surface 40 of the follower ring on the front end of the spider. The cushion block is packed on its periphery by a joint ring *w*, that is held by its resilience in a peripheral groove formed for it in the cushion block, its location being 45 near the forward end of the block.

There are series of water escape passages *y*, produced in the spiders of the piston heads L, which extend from the front to the rear 50 ends of the same, which passages are normally closed by the rings *w*; and it will be seen, that if condensed water accumulates in any considerable quantity within either cylinder, the impact of the water upon the 55 cushion blocks will cause the latter to yield and open the forward terminals of the passages *y*, for a rearward transfer of the water, which will escape from the rear ends of the cylinders B, B'.

60 The main valve C is so adjusted, that it will alternately admit steam into one cylinder, and connect the exhaust port of the other cylinder with the common exhaust passage *a*, *a'*, so that the pistons will be successively 65 acted upon by steam that enters the steam chest D, through a steam supply pipe D², shown broken in Fig. 1, but that in service is extended to a steam generator (not shown).

When the steam engine is to be started, the valve G, is adjusted so as to align its live steam ports with those in the head plate and 70 main valve seat, which will avoid a restriction of steam flow through the ports, the large exhaust passage *g*³ in the valve permitting a free flow of the exhaust steam. An admission of high pressure steam within the steam 75 chest D, will produce an alternate reciprocation of the piston heads L, and a vibration of the frame N, that through the rod O, will rapidly rotate the crank shaft E, which shaft may be extended beyond the bed plate to re- 80 ceive a balance wheel and driving pulley of the usual form. The maintenance of the valve in a fixed position to align its ports with the other live steam ports as stated, is effected by the depression of an arm *h*², that is thus 85 caused to press down the spindle *h'*, which in turn moves the throttle valve into proper position and so retains it until released, the actuation and retention of the arm being produced by the vibration of a cam lever *h*³, that 90 is pivoted on the governor frame and is arranged to engage its toe with the near end of the pivoted arm *h*², as represented in Fig. 3. After a maximum speed has been attained in the working parts of the engine, the governor 95 J, is thrown into service, which will so control the valve G that slight fluctuations in speed, due to alterations in load strain, will be instantly corrected, and a uniform rate of 100 speed be maintained in the main shaft E, and machinery connected therewith which the engine is to drive.

It will be seen that by the peculiar construction of the working parts of the improved engine and their relative arrangement, a high 105 degree of efficiency is secured with a minimum expenditure of motive force, and as the traverse of the piston heads is short, as compared to their area, a high speed is attainable with low frictional resistance, the transfer of mo- 110 tion from the pistons through the vibratory frame N to the crank shaft E, conserving the effective force of steam pressure, so that the percentage of duty performed is high, and compares favorably with that secured in other 115 engines of compound type, that are more complex in construction and expensive to produce.

Having thus fully described my invention, I claim as new and desire to secure by Letters 120 Patent—

1. In a steam engine, the combination with two cylinders supported one above the other, of a single head-plate for the cylinders, a main steam valve, means to move said valve, a throttle valve located in a channel between 125 the head-plate and the seat of the main valve, and a governor device driven from the engine shaft and directly actuating the throttle valve, substantially as described.

2. In a steam engine, the combination with 130 two steam cylinders secured one above the other on a bed plate, piston heads therein, and a connecting rod for each piston head, of an upright vibratory frame on the bed plate,

pivoted to the rods at equal distances from its center of motion, the parallel beams of said frame extending below the lower cylinder, and connected to a double crank shaft 5 of the engine by pins or journal pins, and a connecting rod, substantially as described.

3. In a steam engine, the combination with two steam cylinders secured one above the other on a bed plate, a piston head in each 10 cylinder, and a connecting rod for each piston head, of an upright vibratory frame on the bed plate, pivoted to the rods at equal distances from its center of motion, the parallel beams of said frame extending below

the lower cylinder, a double crank shaft the 15 length of its cranks being less than the distances between the pivot center of the vibratory frame and centers of pins connecting the piston head rods to said frame, and a main connecting rod between the double cranks 20 and a journal pin on the extending lower end of the vibratory frame, substantially as described.

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