

N^o 30,034



A. D. 1897

Date of Application, 18th Dec., 1897

Complete Specification Left, 10th Aug., 1898—Accepted, 8th Oct., 1898

PROVISIONAL SPECIFICATION.

Improvements in Locomotive Engines.

I, JOHN AUDLEY FREDERICK ASPINALL, of Horwich, in the County of Lancaster, Chief Mechanical Engineer of the Lancashire and Yorkshire Railway, do hereby declare the nature of the said invention, to be as follows:—

5 The valves of the ordinary locomotive worked by what is known as "Joys valve motion," or by the ordinary "link" or equivalent motion, do not give so free an exhaust as desired when working expansively and at great speed, as the exhaust steam does not get away freely and this retards and reduces the power of the engine.

10 The object of my invention is to give such an outlet for exhaust steam from the cylinders as will be constant in itself and supplementary to the variable exhaust outlet allowed by the ordinary valves.

In carrying out my invention, the ordinary slide or piston or cylindrical slide valves are used, which both admit steam to and exhaust it from the cylinders actuated by what is known as "Joys valve motion" by preference, or by ordinary
15 valve link motion.

Passages for exhaust steam are arranged in connection with and on the underside of each cylinder by preference, which passages each lead to ports controlled by piston or cylindrical valves by preference, though other slide valves may be used.

20 These exhaust valves for each cylinder are each actuated by a separate excentric, which excentric can partly rotate on the crank shaft until it comes against a stop, and when against such stop it is in its right position for actuating the valves for forward or backward motion as the case may be.

25 This stop may be formed by a segmental slot in the excentric and a key fixed on the crank shaft.

Or there may be projections from the excentric which will come against one of the crank arms in one position for forward motion, and against the other side of the crank arms for the other position for backward motion.

30 The excentrics act upon the above named supplementary exhaust valves through rods and levers.

With the above described combination of valves, the steam on reversing the engine would pass through the cylinders when first admitted, directly to the chimney through the exhaust pipes, until the driving wheels had made about half a revolution as on reversing the direction of the engine, the excentrics
35 would remain stationary and inactive during the time the crank axle was thus rotating, during which time the steam would pass through the cylinders as above explained.

In order to prevent this passage of the steam, a stop valve is introduced in the passage (common to both cylinders) from the ports of the supplementary
40 exhaust valves to the exhaust pipe, this stop valve may be a sliding gridiron or cylindrical many ported valve.

[Price 8d.]

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This valve is shut when the reversing lever is in either of its extreme positions. The stop valve is actuated by a rod jointed with an arm on the reversing shaft so that while the reversing lever is in either of its extreme positions the stop valve is shut but immediately the reversing lever begins to move from either extreme position towards the mid position, the stop valve is open more or less and remains open in every position of the reversing lever between its two extreme positions. 5

This valve only is of use when the reversing lever is in either of the two extreme positions, and until the eccentrics have taken up their proper position for the direction in which the engine has commenced to travel. 10

Dated this Seventeenth day of December 1897.

PETER J. LIVSEY,
Agent.

COMPLETE SPECIFICATION.

Improvements in Locomotive Engines. 15

I, JOHN AUDLEY FREDERICK ASPINALL, of Horwich, in the County of Lancaster, Chief Mechanical Engineer of the Lancashire and Yorkshire Railway, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement;— 20

The valves of the ordinary locomotive worked by what is known as "Joys valve motion," or by the ordinary "link" or equivalent motion, do not give so free an exhaust as desired when working expansively and at great speed, as the exhaust steam does not get away freely and this retards and reduces the power of the engine. 25

The object of my invention is to give such an outlet for exhaust steam from the cylinders as will be constant in itself and supplementary to the variable exhaust outlet allowed by the ordinary valves.

In carrying out my invention, the ordinary slide or piston or cylindrical slide valves are used, which both admit steam to and exhaust it from the cylinders actuated by what is known as "Joys valve motion" by preference, or by ordinary valve link motion. 30

Passages for exhaust steam are arranged in connection with and on the underside of each cylinder by preference, which passages each lead to ports controlled by piston or cylindrical valves by preference, though other slide valves may be used. 35

These exhaust valves for each cylinder are each actuated by a separate eccentric, which eccentric can partly rotate on the crank shaft until it comes against a stop, and when against such stop it is in its right position for actuating the valves for forward or backward motion as the case may be. 40

This stop may be formed by a segmental slot in the eccentric and a key fixed on the crank shaft.

Or there may be projections from the eccentric which will come against one of the crank arms in one position for forward motion, and against the other side of the crank arms for the other position for backward motion. 45

The eccentrics act upon the above named supplementary exhaust valves through rods and levers.

With the above described combination of valves, the steam on reversing the engine would pass through the cylinders when first admitted, directly to the chimney through the exhaust pipes, until the driving wheels had made about half a revolution as on reversing the direction of the engine, the eccentrics 50

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would remain stationary and inactive during the time the crank axle was thus rotating, during which time the steam would pass through the cylinders as above explained.

In order to prevent this passage of the steam, a stop valve is introduced in the passage (common to both cylinders) from the ports of the supplementary exhaust valves to the exhaust pipe, this stop valve may be a sliding gridiron or cylindrical many ported valve.

This valve is shut when the reversing lever is in either of its extreme positions.

The stop valve is actuated by a rod jointed with an arm on the reversing shaft so that while the reversing lever is in either of its extreme positions the stop valve is shut but immediately the reversing lever begins to move from either extreme position towards the mid position, the stop valve is open more or less and remains open in every position of the reversing lever between its two extreme positions.

This valve only is of use when the reversing lever is in either of the two extreme positions, and until the excentrics have taken up their proper position for the direction in which the engine has commenced to travel.

Fig. 1 is a cross sectional elevation of the two cylinders of a locomotive showing the ordinary slide valves in position, circular chambers for the supplementary cylindrical exhaust valves (which are preferred) and the valve (in this case a gridiron V slide valve) for closing the outlet from the supplementary exhaust valve to the chimney, the section being on the line A—B Fig. 2.

Fig. 2 is a longitudinal elevation in section, the section being in a vertical plane on say the line C—D—E—F Fig. 1, or partly through the longitudinal axis of one cylinder and entirely through its supplementary exhaust valve chamber showing the valves therein in section.

Fig. 3, is a longitudinal section through the gridiron valve chamber with the casing of the valve seating shown in elevation. Fig. 4, is a side elevation of the gridiron valve detached, and Fig. 5, is a cross section thereof through one of its ports. The two cylinders *a*, are formed in one casting as usual. *a*¹, are the ordinary exhaust cavities for the ordinary slide valve *b*, *a*², the ordinary steam ports and passages.

*a*³, are cylindrical chambers for the supplementary exhaust valves (piston valves by preference) each of which chambers *a*³, communicates with its cylinder *a*, at each end by passages *a*⁴, indicated in Fig. 1, by dotted lines *a*⁴.

The chambers *a*³, are bored out for their piston valves at each end. These valves are formed at one end by a cylinder *c*, which fits the bore, and at one end has a pin *c*², to which the end of the connecting rod *c*³, for giving the sliding to and fro movement from the excentric, is jointed. The cylinder *c*, is reduced in diameter where the cylindrical packing ring *c*⁴, comes, which is made in the usual manner, thicker on one side than at the opposite diametrical side, and it is slit to expand by its elasticity into the bore so as to fit steam tight therein.

This elastic packing ring *c*⁴, comes against a shoulder on the cylinder *c*, at one end, and against a loose disc *c*⁵, at the other end.

The inner discs *c*⁵, for both valves are kept at the required distance apart by a tube *c*⁶, extending between them, and the two valves are held against the ends of the tube *c*⁶, and so as to move together by a bolt *c*⁷, pushed in from one end, the head *c*⁸, of this bolt coming into a recess in the cylinder *c*, while the other end of the bolt passes through holes in the axis of the disc *c*⁵, separating piece under the packing ring *c*⁴, and cylinder *c*, and is secured by lock nuts *c*⁹.

At each end of the cylinder *a*, there are cylinders *c*^a, secured thereto by bolts or screws and flanges or ears, which cylinders *c*^a, are extensions of the bore for the valves to work in. These cylinders *c*^a, at the upper sides have holes into which nozzles *c*^b, are screwed for coupling up pipes for conveying lubricant to the valves.

The cylinder *c*^a, at one end has a cap *c*^c, to close its end against dirt and dust,

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which may be secured upon the end of the cylinder c^a , by a clip. This cap has vent holes drilled in it not shown in drawing.

At the lower side of the valve chamber a^3 , under each valve there is a hole a^5 , communicating with a passage leading to the passage a^4 , and to an outlet a^6 , in which a pipe may be screwed to convey away condensed steam from the supplementary exhaust valve chamber c , and the cylinders a . There is also a small passage e , formed between the two chambers a^3 , having an outlet or outlets at e^1 , for condensed steam which is or are constantly open. 5

The supplementary exhaust valves are worked as before stated each by a separate excentric which is so arranged as not to rotate during half a revolution of the crank axle when the engine is reversed, this being effected by hook stops by preference from the excentric, one of which comes against one side of the crank arm at the first half revolution of the crank after it has been reversed, and then the excentric is rotated with the crank shaft until again reversed when it stands again until the other hook stop coming against the crank arm on its other side becomes the driver for that direction of rotation. 10 15

The ports a^7 , from the chambers a^3 , of the supplementary exhaust valves each communicate with a separate passage a^8 , (see Fig. 1) which leads to a V gridiron valve d , in a passage a^9 , common to the supplementary exhaust valves for both cylinders, and this passage by a cross passage a^8 , communicates with the exhaust cavities a^1 , of the ordinary slide valves of both cylinders. The chamber a^b , for the gridiron valve d , is bored out to receive a casing d^1 , cylindrical on its exterior flanges (see Figs. 1 and 3) and this casing d^1 , is formed with ports d^2 , (four are shown) and seatings for a V gridiron valve d , which has also ports in it to correspond to those in the seating casing d^1 . The ends of the casing d^1 , are flanged and circular, and between the two ends there are circular ribs or segments d^3 , on the exterior of the casing to fit the bored out chamber a^b , so that when the casing is inserted in its chamber from one end it can be secured firmly therein by a cap d^4 , secured at one end by ears or flanges and bolts or set screws to the end of the cylinder. 20 25 30

When the gridiron V valve d , is placed in position it is held from lifting from its facings by the rush of the exhaust steam by bars d^5 , extending across the seating which are secured to its edges by set screws.

The V gridiron valve d , can be placed in position and secured from lifting before the casing d^1 , is placed in its chamber a^b , from one end. 35

The valve d , has a downward hook like projection d^6 , from one end, which will engage with an upright hook projection on the end of the rod d^9 which is to actuate it, which rod passes through a hole or gland d^7 , for it in the cap d^4 , which is secured to the end of the cylinder.

The V gridiron valve d , is closed at each end, and its ports are not so wide as those in the seating and the bar or space between the ports in the valve will cover the ports in the seating with a little "lap" on each side. 40

The rod for actuating the valve d , is jointed to an arm secured on the reversing lever shaft, or a shaft connected therewith, which arm is of such length that when the reversing shaft is oscillated either way to the full extent the V valve d , will receive such extent of movement as to cause the bars between its ports d^2 , to cover the ports in the seating d^1 , so that when the reversing lever is moved from either extreme, the ports will begin to open after the valve has moved to an extent equal to the "lap" on the valve, and the exhaust outlet from the supplementary exhaust valves will thus remain closed as long as the reversing lever is in its extreme position, but after the first half revolution of the crank shaft after reversing, the reversing lever may be moved towards the middle position when the V grid valve d , will open and allow the exhaust steam passing the supplementary exhaust valves to go to the blast pipe of the engine. 45 50

d^8 , is a screw plug for closing the hole used for supporting the core when casting and when boring out the chamber a^b . 55

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Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

- 5 1. In fluid motor engines the combination of supplementary exhaust valves with ordinary slide valves having exhaust ports substantially as hereinbefore described.
2. The combination of supplementary exhaust valves exhausting through passages communicating with the exhaust cavity of the exhaust port of ordinary slide valves substantially as hereinbefore described.
- 10 3. The combination of supplementary exhaust valves exhausting through a passage into the cavity of the exhaust port of an ordinary slide valve, and a valve which is closed when the engine is reversed substantially as and for the purpose hereinbefore described and illustrated by the drawings.
- 15 4. The combination and arrangement of locomotive engines with supplementary exhaust valves each worked by a single excentric, ordinary slide valves worked by an ordinary link or equivalent motion, and a valve which can be opened and closed by the reversing lever substantially as and for the purpose hereinbefore described and illustrated by the drawings.

Dated this 9th day of August 1898.

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PETER J. LIVSEY,
Agent.

FIG. 1.

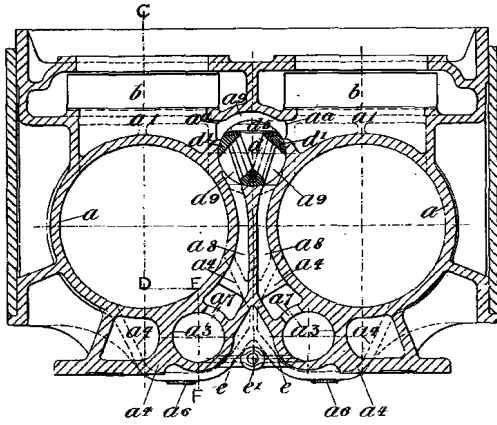


FIG. 2.

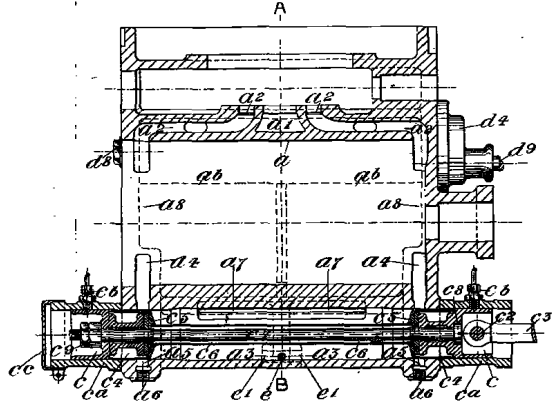


FIG. 3.

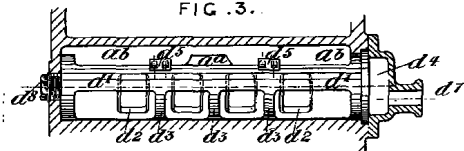
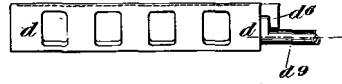


FIG. 5.



FIG. 4.



[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 1.

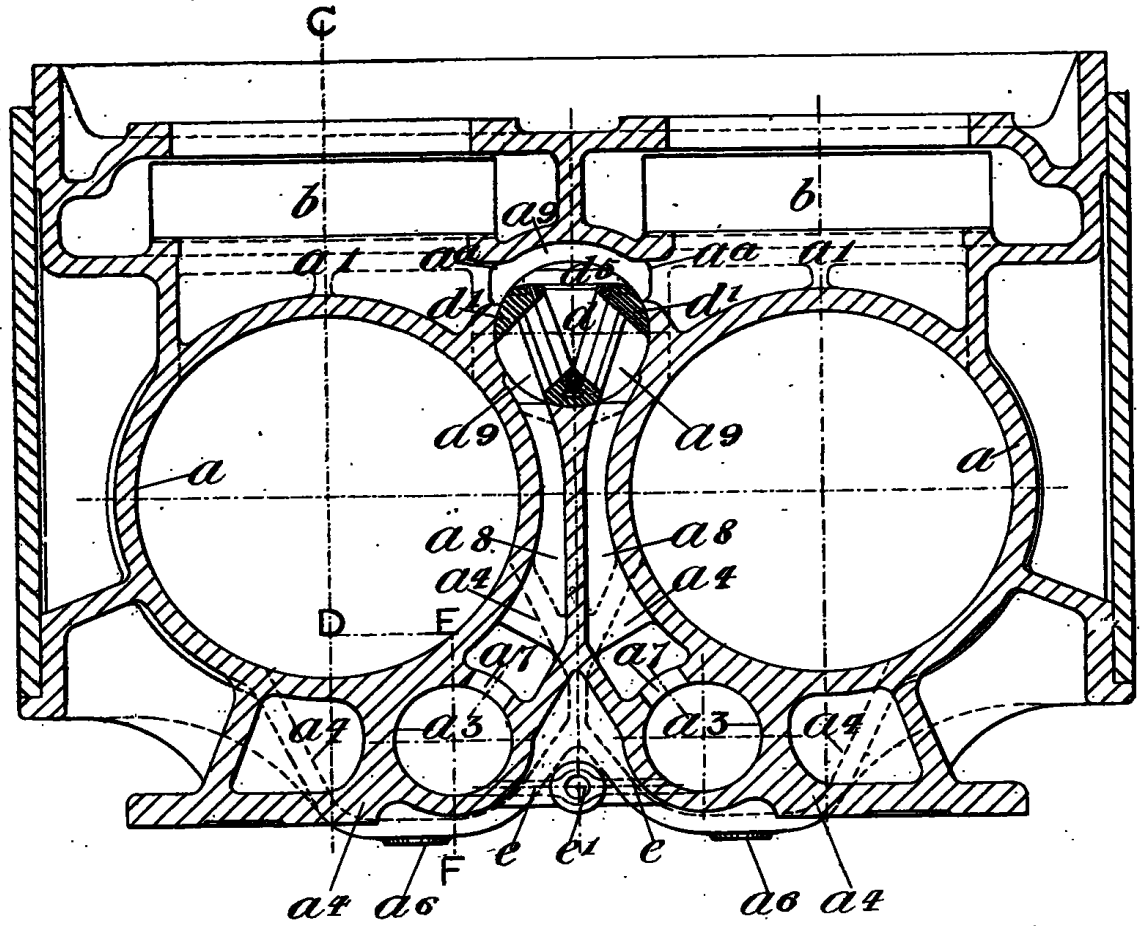


FIG. 2.

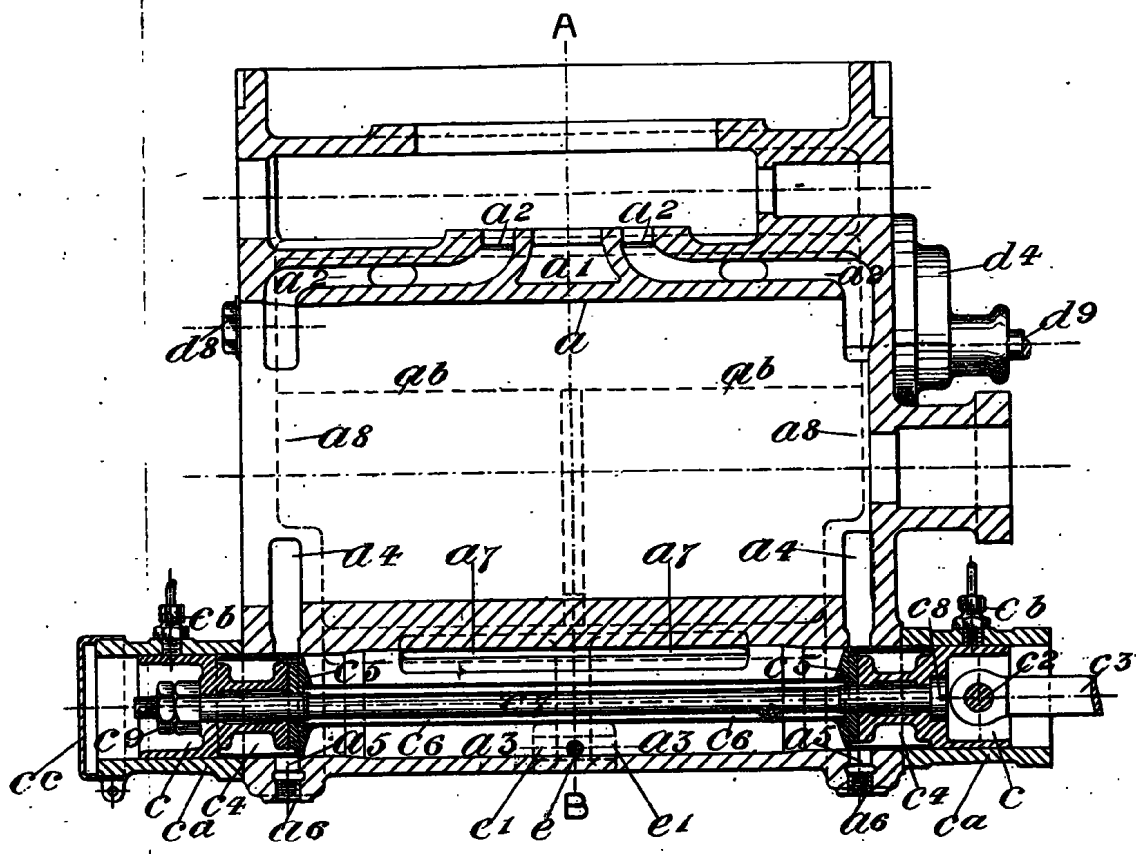


FIG. 3.

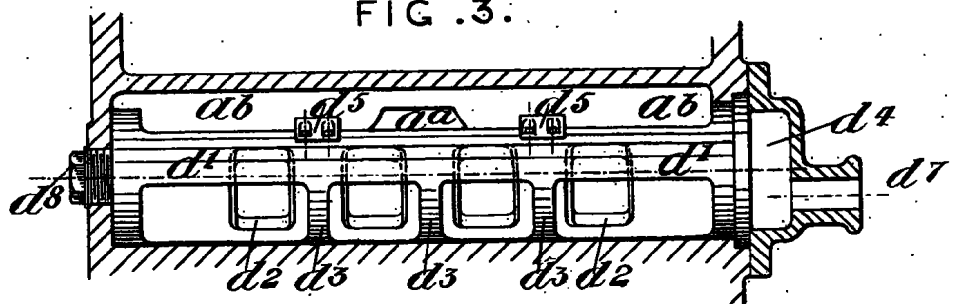


FIG. 4.

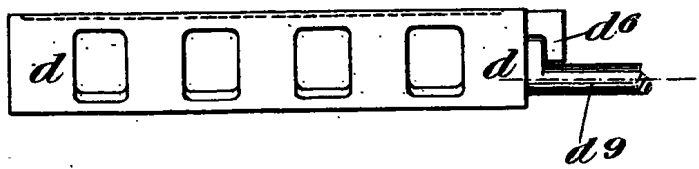


FIG. 5.



[This Drawing is a reproduction of the Original on a reduced scale.]