No Printed Specification Available

7915½X

# S. H. Long,

## Steam Slide Valve.

Patented Dec. 30, 1833.

Fig: 10.

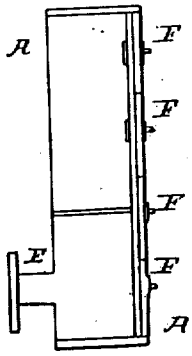



Fig: 7.

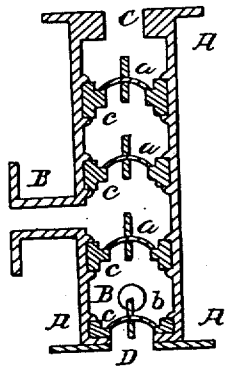



Fig: 9.

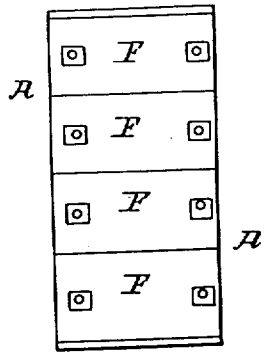



Fig: 6.

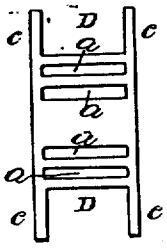



Fig: 8.

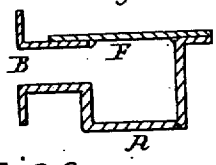



Fig: 2.




Fig: 5.

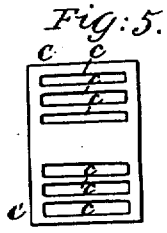



Fig: 3.

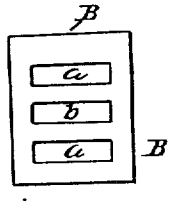



Fig: 1.

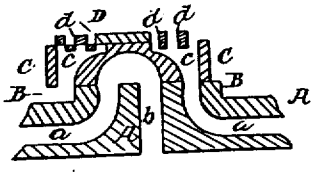
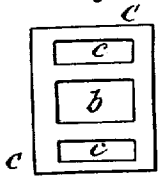



Fig 4.




N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

Dec. 30. 1833 315

Stephen H. Long. U.S. Army 7915½ X

# Letters Patent

The schedule referred to in these Letters Patent and making
part of the same containing a description in the words of the said
Stephen H. Long himself of his improvement in the construction
of Main Steam Valves of Locomotive and other Steam engines; the
Force Pumps of such engines and the wheels for Locomotive engines

To all to whom these presents shall come
Be it known that I Stephen H. Long of the United States
Army have invented and applied certain new and useful improve-
ments in the construction of the main Steam valves of the Loco-
motive Locomotive and other Steam engines. Also in the con-
struction of the force pumps of such engines. And also in the man-
ner of constructing the wheels of Locomotive Engines and of other
Railway Carriages and that the following is a full and exact
description of my said improvements viz.

First of the main Steam valve:

My improvement in the steam valve consists in the addition
of two slide valves one above the other which I designate the upper
and lower slide valve, and which in conjunction I denominate
the double slide valve. The object of the upper valve is to inter-
cept or cut off the passage of the steam into the cylinder at about
half of any stroke of the piston while that of the lower
valve is as usual to regulate the admission of Steam alter-
nately to each end of the Cylinder.

The lower valve differs from the ordinary slide valve in having
its upper surface extended at both ends on the direction of
its motion so far enough to give place to two ports each
[illegible] of the same form and area that [illegible] of the
steam [illegible]

into two or more orifices in its facing through to the upper surface of the lower valve. The orifices last mentioned are of equal area but transversely of the valve with those of the valve seat and have an aggregate area equal to that of either orifice situate in the lower side of the valve or in the valve seat itself. When there are two orifices on either side of the centre of the valve and in its upper surface the area of each should be equal to one half that of the lower orifice and when there are three orifices in the upper surface the area of each should be equal to one third that of the lower orifice. and in a similar proportion for a greater number of orifices. All the orifices leading through the lower valve serve to convey the steam from the steam chest to the side pipes of the cylinder. The lower valve also differs from the common slide valve in the manner of its attachment to the valve rod which is effected by means of a single nut which serves not only to confine the valve to the rod but to adjust the valve in its proper position. It moreover differs from the common valve in being furnished with guides to regulate the movements of the upper valve. The upper valve is furnished with one or more perforations on each side of its centre corresponding to the orifices in the upper side of the lower valve and respectively of equal area. The number being less by one than that of the lower valve. on each side of its centre. The correspondence between the orifices of the upper and lower valves is such however that when the orifices of the lower valve are uncovered by the upper valve on one side of their centres. the orifices on the other side are covered by the upper valve and vice versa.

The alternate opening and closing of the orifices of the lower valve is effected by intercepting the movements of the upper valve and compelling the lower valve to [illegible] while the upper valve remains at rest. The relative distance through which the two valves [illegible]

of the Air Pump, Governed by the lower valve and when there are three cranks the position of the upper valve should be 120° in advance of the lower and in like proportion for any other number of cranks. The manner of adjusting the upper and lower valves and of intercepting the passage of the steam into the cylinders at about half the stroke of the piston will be more clearly understood by an inspection of the drawings hereto annexed.

Second. Of the force Pump.

My method of constructing and adjusting the valves of the Force Pump for Locomotive and other Steam Engines consists in the introduction of two or more valves through which the water is forced from the Pump to the Boiler, and two other similar valves through which the water is drawn into the Pump. All of which valves are arranged one above another and at suitable intervals asunder in one and the same valve box or chamber which may be either of a cylindrical form or of the form of a Parallelopipedon. The latter being deemed most convenient.

The two Upper valves occupy the lower while the four valves occupy the upper portion of the valve chamber. The barrel of the force Pumps in which the plungers or pistons operate and which may be of any convenient form communicates with the valve chamber at a point and through an orifice situated between the upper and the four valves.

The portion of the valve chamber which is situated between the two upper valves has an orifice in one of its sides communicating with a hand pump to be worked occasionally by manual labour for the purpose of supplying the boiler when the engine to which it is attached is not in operation.

The water is drawn into the valve chamber and thence into the force Pump through an orifice in the lower extremity of the chamber and is forced from the same through a similar orifice in the upper extremity of the chamber [illegible] Each of the valve chambers is provided with a [illegible] by which the [illegible]

in a manner to prevent all leakage — The entire front of the
tube chamber except a small moulding at the top and bot
tom is covered by three lids either or all of which may be removed
and replaced at pleasure by means of the screw bolts which
confine them to the chamber — The form of the chamber may
be Cylindrical or square as may be found most convenient
the square form however deemed preferable inasmuch as it
affords greater facilities for the insertion of the tubes and for the
adjustment of the lids or covers

Wheel of the Wheels

In addition to former improvements in the construction of the
Wheels of the Pennsylvania Locomotive. I claim as a new
and useful improvement in the construction of Locomotive Engines
the application of circular iron hubs cast in a single piece each
for the reception of wooden spokes. said Hubs being constructed
after the manner heretofore adopted by M. Imlay of Philadel
phia in the construction of baithem and passenger cars

I also claim as a new and useful improvement in the
construction of Car Wheels and especially of the Wheels of Locomo
tive Engines the adoption and use of double felloes of wood in
connection with cast iron hubs and wooden spokes

The wheel rim is composed of two distinct series of half felloes
keys applied to the spokes by means of notches in each series em
bracing the tenons of the spokes instead of mortises. The felloes are
arranged in such a manner that the half felloes of one series
break joint with those of the other series. By this means the
necessity of doubling the felloes together is obviated although
double felloes either square or round may be employed if desirable
The double felloes are firmly bonded together by nails passing thro
them near to and on both sides of every spoke. In applying the
iron tire to the Wheel two contiguous Cars should be taken
upon the to the Wheel one Car should be taken
to avoid driving the nails nearly flat with the surface of the
felloes — Inserted to correct. The felloes may be of any required
felloes

and to insure additional strength and solidity to the whole I employ two clamps situated between the felloes and the tire at three points where the ends of the felloes are united and when of course the abutment is weakest. These clamps are applied transversely of the Wheel Tire and extend quite across the felloes. - Each clamp is composed of a bar of iron about half an inch thick and about one and a half inches wide and is furnished with a half head or toggle at each end and of a depth equal to that of the bar and formed by bending the ends of the bar at right angles with itself. - The heads of the clamps are adapted to recesses in the felloes prepared for their reception while the intermediate parts of the clamps lie imbedded in the felloes and in immediate contact with the tire. The nails or bolts by which the tire is fastened often the same through the clamps which are furnished with holes for their reception.

The annexed Drawings and their explanations will exhibit more clearly the nature of the principal improvements above described and the manner of their application.

Explanations of the Drawings

Fig 1. A vertical section of the double valve and its seat, with a portion of the Steam Chest.

A a part of the Steam Chest - B the valve seat a a portions of the side orifices communicating with the steam Cylinder - b - the steam pipe for exhausting the Cylinder or the exhaust pipe - C the lower slide valve

c c the steam ways leading through the valve each way communicating with a single orifice in the lower surface of the valve and with three orifices in its upper surface

D the upper slide valve communicating with the lower valve by means of the orifices d d. The movements of the upper valve are effected by sliding on the upper surface of the lower valve and are such as to alternately open two steam ways through the latter alternately to the exhaust pipe b and the

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Fig 2. A vertical section of the lower Side valve same as C.c.2 of Fig 1.

Fig 3. A horizontal view of the Steam valve seat same as B. a. a. of Fig 1.

Fig 4. a horizontal view of the lower surface of the lower Side valve.

Fig 5. a horizontal view of the upper surface of lower Steam valve. C.c. b of Figs 4 & 5 same as in Figs 1. 2.

Fig 6. a horizontal view of the upper Steam valve same as D. d. of Fig 1. c. Arms projecting from the valve and impinging against the sides of the valve chest in order to intercept the movements of the valve for the purpose of allowing the lower valve to slide beneath it far enough to close the orifices alternately on each side of the valve centre.

Fig 7 a vertical section of the valve chamber of the force pump exhibiting the relative positions and arrangement of the valves A. the valve of suction. B a branch pipe or orifice communicating with the barrel of the force pump which has no other connection with the valve chamber. C the orifice through which the water is forced into the boiler. D. the orifice through which the water is drawn into the valve chamber and pump E. the orifice communicating with the barrel of the hand pump. a the force valve b the draft valve c the valve seats.

Fig 8. a horizontal section of the valve chamber through the tube communicating with the force pump.

A and B same as in Fig 7.

F a case or Bonnet covering one of the apertures of the valve chamber — Fig 9. a front view of the valve chamber exhibiting the screws F' by which the apertures of the chamber are closed — Fig 10. a side view of the valve chamber exhibiting the tube communicating with the hand pump

A. E F' same as in Figs 7 & 8.

The improvements described in the foregoing specification

and claimed as new useful and original are briefly as follows viz — 1st The construction and application of the double slide valve and all Steam ways not exceeding the usual ratio of Locomotive Engines but of other Steam Engines in which it is desirable to intercept the passage of the steam into the working Cylinder at half or less than half the stroke of the piston — Second — The adaption and construction of a single valve chamber for the force pump of a Locomotive or other Steam Engine in which chamber all the valves of the force pump are situated one above another. the number of valves being increased or diminished of any increase that may be deemed desirable so that there may be one or more lower induction valves and one or more force or ejection valves — 3rd I claim as new and useful the mode of connecting the valve chamber with the force pumps by means of which the water is first drawn into the force pumps through the lower part of the valve chamber and then forced over and over and the boiler through the upper part of the same valve chamber

4th I also claim as new and useful the method of attaching hand pumps to the main valve chamber which is effected by a communication with the valley at any point situate between any two of the valves — 5th I claim the employment of double flanges in the construction of wooden wheels for Rail Road carriages of all descriptions and the application of circular tires of cast iron each tire being formed of a single casting. to Locomotive Steam Engines

These several improvements 2nd 4th & 5th I claim more especially as they are applicable to Locomotive or other Steam Carriages intended for Rail Roads

In testimony that the above is a true Specification of my said improvements as above described I have hereunto set my hand this twenty sixth day of August A.D. 1833.

Witness
Stanley Hiscutt
Wm H. Patrick

265 287

Jos. Hague.

Exd
Offd