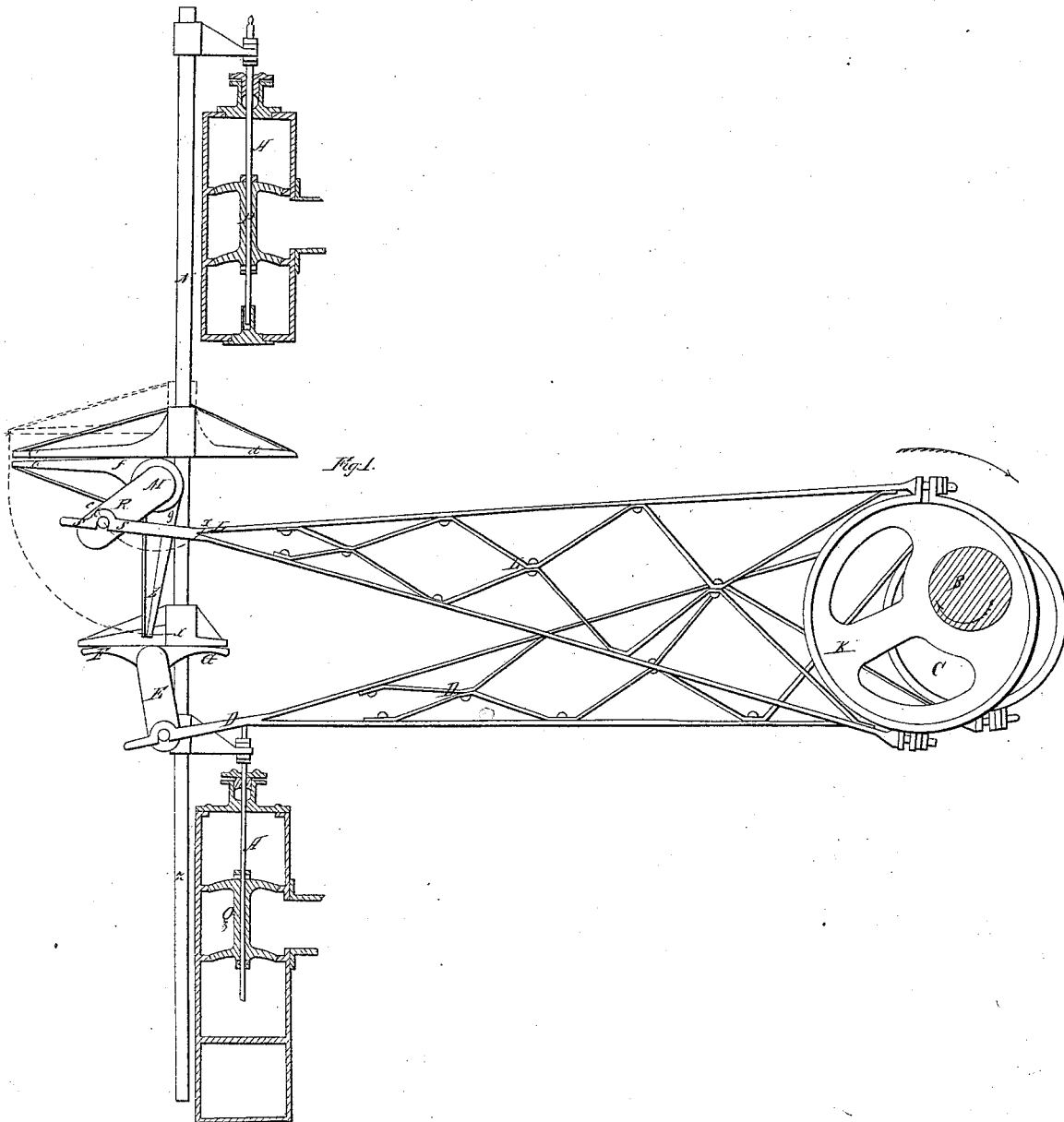


R. L. & F. B. Stevens.
Steam Engine Valve.

Sheet 1-2 Sheets.

Nº 1950.

Patented Jan. 25, 1841.



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Steam Engine Valve.

Sheet 2-2 Sheets

Nº. 950.

Patented Jan. 25, 1841.

Fig. 3.

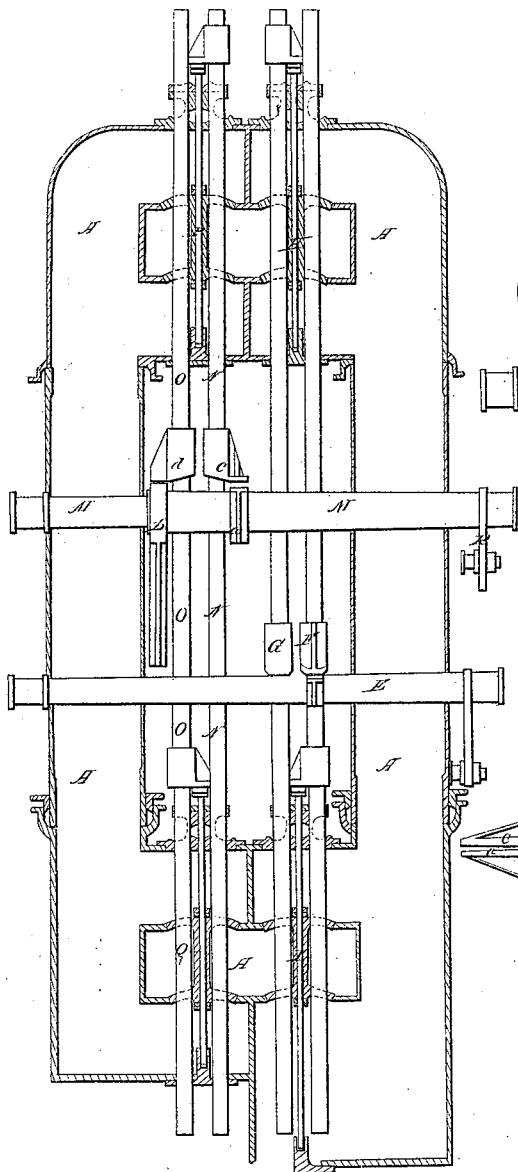


Fig. 6.

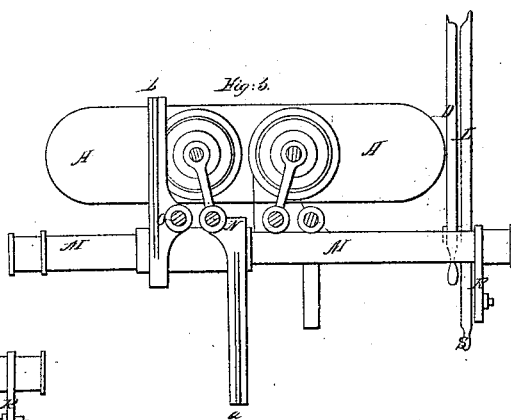
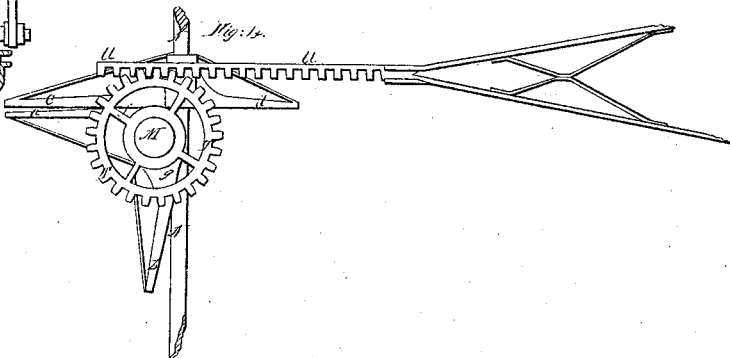


Fig. 14.



UNITED STATES PATENT OFFICE.

ROBERT L. STEVENS AND F. B. STEVENS, OF NEW YORK, N. Y.

METHOD OF WORKING THE STEAM-VALVES OF STEAM-ENGINES WHEN THE STEAM IS CUT OFF AND ALLOWED TO ACT EXPANSIVELY.

Specification of Letters Patent No. 1,950, dated January 25, 1841.

To all whom it may concern:

Be it known that we, ROBT. L. STEVENS and FRANCIS B. STEVENS, of the city of New York, in the county of New York and State of New York, have invented an improved method of working the steam-valves of steam-engines when the steam is cut off at any portion of the stroke of the piston and allowed to act expansively during the remainder.

Engines in which the steam is cut off have either a separate valve or else use the steam valves themselves for that purpose. When the steam valves are thus applied the mode hitherto used for working them has been by means of a cam wheel placed on the main shaft of the engine which through the intervention of a rod and rock shaft raises and lowers the valves at proper intervals or by means of tappets placed on the lifting rods or on the pump rods which last method is commonly known and described as a hand gear.

In our improvement (the exhaust valves being worked by any of the several methods hitherto used for that purpose) we raise the steam valves and lower them at any portion of the stroke of the piston by means of a separate and independent crank, or eccentric wheel, giving an alternate rotary motion to a rock shaft which by means of two toes, placed on the opposite sides of its center of motion, alternately raises and depresses each valve. When the toes are affixed to the rock shaft so that their faces are in the same straight line, as soon as the toe on one side of the rock shaft has lowered one valve the toe on the opposite side of the shaft begins to lift the opposite valve: in this case one valve is not closed until the other begins to open and the steam is not intercepted until the end of the stroke of the piston: but when the toes are affixed to the opposite sides of the shaft so that their faces are not in the same straight line but are depressed to an angle less than two right angles after the toe on one side of the rock shaft has lowered the valve the rock shaft will revolve through a certain interval before the toe on the other side of the shaft begins to lift the opposite valve: during which interval neither valve being raised the steam in the cylinder will be acting, expansively. To explain this more

clearly a reference will be necessary to the accompanying drawings.

Figure I is a side elevation of the gearing above described together with the section of a pair of side pipes containing balance valves. Fig. II is a front elevation of the same. Fig. III is a ground plan of the same. Fig. IV is a side elevation of a cog wheel and rack to be substituted in place of the arm and eccentric hook.

A is the side pipes.

B is the main shaft of engine.

C is the eccentric for working the exhaust valves for which a crank may be substituted.

D is the eccentric rod for the same.

E is the rock shaft for raising the exhaust valves.

F and G are the two lifting rods for the same.

H is the upper exhaust valve and I is the lower exhaust valve.

K is the eccentric wheel for working the steam valves.

L is the eccentric rod for same.

M is the rock shaft and O and N are the two lifting rods for same.

P is the upper steam valve.

O is the lower steam valve.

R is the arm of the rock shaft M.

S is the eccentric hook attached to the eccentric rod L.

T is a cog wheel which may be substituted in place of the arm R, and U a rack which may be substituted in place of the hook S.

a is the toe affixed to the rock shaft M for working the valve P.

b is the toe affixed to the rock shaft M for working the valve Q.

c and *d* are toes affixed to the lifting rods N and O against which the toes *a* and *b* act.

In the drawing the exhaust valves H and I are represented as being worked according to a common method by the eccentric wheel C, the rod D, the rock shaft E, and the lifting rods F and G. The steam valves P and Q are represented as being worked by the separate and independent eccentric wheel K the rock shaft M the toes *a* and *b*—*c* and *d* and the lifting rods O and N. The piston being supposed at the top of the cylinder the toe *a* will be in the position shown in the drawing. As the main shaft

B moves in the direction represented by the arrow the arm R will move from the right to the left and the toe *a* will raise the toe *c* to the position shown by the dotted lines lifting the valve P, and allowing the steam to act on the top of the piston. After the arm R has vibrated to the extremity of its motion from right to left and reached the point marked E raising the toes *a* and *c* to the position shown by the dotted lines, it returns from left to right lowers the toes *a* and *c* to the original position and shuts the valve P. But after the toe *c* has returned to its original position, the arm R still continues its motion from left to right (neither toe of the rock shaft moving either valve) until the toe *b* comes in contact with the toe *d* when the piston will have arrived at the bottom of the cylinder. Now the steam will be cut off from the upper side of the piston and will act expansively in the cylinder from the time the toe *a* has lowered the valve P into its seat until that the toe *b* is brought in contact with the toe *d* and begins to lift the valve Q. The portion of the stroke that the piston shall have traveled when the steam is cut off depends upon the angle that the faces *a*, *f*—*b*, *g*, of the toes *a* and *b* make when the toes are affixed to the shaft M. For if the toes *a* and *b* were affixed to the rock shaft M so that their faces were in the same straight line as soon as the toe *a* had lowered the valve P the toe *b* would begin to lift the valve Q and the steam would not be cut off until the end of the stroke of the piston.

In ordinary cases the eccentric rod L may be connected with the rock shaft M by the eccentric hook S and arm R but where it may be required to intercept the steam after only a very small portion of

the stroke may have been performed it will be found requisite, (the toes *a*, and *b*, being affixed to the shaft M so that their faces make a very acute angle,) that the shaft M should vibrate through a large portion of a circle to lift the valves to the necessary height, to effect this we remove the arm R from the shaft M and substitute the cog wheel T, Fig. IV. We also affix a rack U on the end of the eccentric rod L instead of the eccentric hook S by which means the shaft M can be made to vibrate through any required angle. We also make the toes adjustable on the shaft, so that their angles may be changed; they are held in place by means of a wedge or screw.

What we claim as our invention is—

1. The combination of an additional and separate eccentric wheel to work a rock shaft to raise the steam valves in combination with any of the several methods hitherto used for working the exhaust valves.

2. We also claim the manner in which the toes are affixed to the rock shaft, so that the shaft is made to vibrate during a certain interval without either toe communicating motion to either valve.

3. We also claim the combination of the cog wheel and rack in the manner set forth for the more completely effecting our object.

In testimony whereof we the said ROBERT L. STEVENS and FRANCIS B. STEVENS hereto subscribe our names in the presence of the witnesses whose names are hereto subscribed the 20th day of November in the year of our Lord one thousand eight hundred and forty.

ROBT. L. STEVENS.
FRANCIS B. STEVENS.

Witnesses:

WM. H. CROSBY,
JOHN P. CROSBY.