H. H. Grame,

Steam Cut-Off.

No. 5,026. Patented Mar. 20, 1847.

Fig. 4.

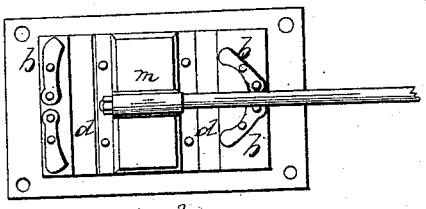


Fig. 3

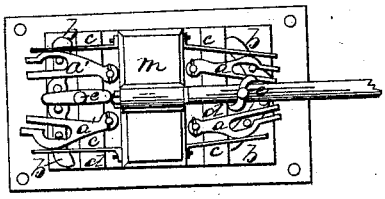


Fig. 2.

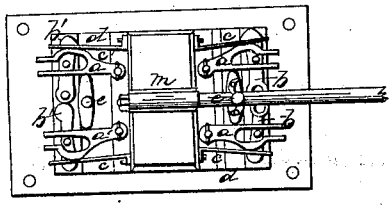
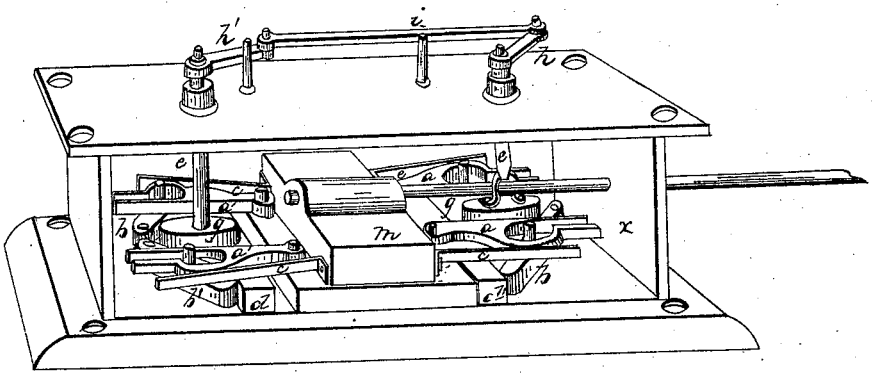


Fig. 1.



UNITED STATES PATENT OFFICE.

HENRY H. GRAME, OF PATERSON, NEW JERSEY.

CUT-OFF VALVE.

Specification of Letters Patent No. 5,026, dated March 20, 1847.

To all whom it may concern:

Be it known that I, HENRY H. GRAME, of Paterson, county of Passaic, State of New Jersey, have invented a new and Improved Method of Making and Using the Expansion-Valves of Steam-Engines, of which the following is a specification.

The nature of my invention consists in the introduction of independent valves in the ordinary "steam chest for sliding valves" with means of connecting or disconnecting them to the slide valve, operating (when connected) in such a way as to prevent any further ingress of steam within the cylinder after the piston has passed through a certain part of its stroke, and when disconnected allowing the steam to work through the whole stroke of the piston. And I do hereby declare that the following is a full clear and exact description of the construction and operation of the same, reference being had to the annexed drawings making part of this specification, in which—

Figure I is a perspective view, and Figs. II, III, and IV, are plans.

Similar letters refer to similar parts in all the figures.

To the ordinary slide valve of the steam engine, I attach four pieces of metal *a*, *a*, *a′ a′* called hooks. These hooks are so contrived as to operate on four other pieces of metal *b*, *b*, *b′*, *b′*, called rockers. These rockers are hinged at one end, near the end plates of the steam chest. Each rocker has a pin driven in near its center, which pin passes up through the opening in the hooks. There is also attached to the main valve, four springs *c c c c*, which press against the backs of the hooks *a*, tending to force them inward toward each other.

The letters *d*, *d*, represent an independent cut off valve. These are two pieces of metal, having four sides forming a square, and lie parallel to the edge of the main valve, on either side. Their length and face must be of such dimensions as to cover the steam openings (when on them). The letters *e*, *e*, represent two shafts passing through the top of the steam chest. They have attached, at their lower ends a cross piece or stop *g g*, and on their tops, two arms *h*, *h′*, and a connecting rod *i*. These operate on the hook, and is the contrivance for connecting or disconnecting the cut off valves.

The operation is as follows: On starting the engine the main valve *m* has its ordinary reciprocating motion. It is seen advancing toward *x*, and the steam is passing into the cylinder through the opening in the direction of the arrow. As the valve carries the hooks along with it, they in turn operate on the rockers *b′ b′*. The pins in the rockers being midway, from end to end, give to the outer end, an accelerated motion, and the two outer ends acting against the cut off valve *d*, causes it to advance toward the main valve *m*, with twice its velocity, so that when the piston has arrived at half stroke (or any given part thereof according to the set of the valve), the cut off valve *d* has overtaken the main valve *m*, and consequently closed the steam opening so as to prevent the ingress of any more steam to the cylinder during the rest of the stroke. The hooks *a*, *a*, *a′*, *a′*, only operate to cause the cut off piece *d* to follow after the main valve, and close the steam openings, the main valve on its return, pushing it back to the place of starting, as seen at *d′* Fig. I.

The cut off can be disconnected, at any time, either during the working of the engine or when at rest by means of the parts *h′*, *h*, *i*, which connect with the stops *g*, *g*. When in gear the stops *g g* stand parallel to the hooks *a*, *a*, *a′*, *a′*, as seen in Figs. I and III. In disconnecting the arm *h* is moved toward the pin near *i* on the top of the steam chest. This causes the ends of the stops *g*, *g*, to press apart the hooks, (as seen at Fig. II), which prevents them from operating on the rockers *b*, *b*, *b′*, *b′*. The springs *c c c c* force the hooks into gear on removal of the stops *g*, *g*.

The principal advantage in this arrangement is the manner of connecting the "cut off" valves with the ordinary slide valve, and operating the whole by one stem or rod, and a single external connection, with the ability to unhook, and put on the whole force of the steam at any moment, whether in mo-

tion or stationary. The whole combining cheapness with little liability to get out of order.

I do not claim the valve *m* or an expansion valve within the steam chest, but

What I do claim as my invention and desire to secure by Letters Patent, is—

The peculiar manner of connecting and combining the cut off valves *d*, *d*, with the main valve *m*,—the hooks *a*, *a*, *a'*, *a'*, rockers *b*, *b*, *b'*, *b'*, and the stops *g*, *g*. The said several parts being contained within the steam chest, and worked by the main valve *m*, operating and combined in the manner and for the purposes herein set forth.

HENRY H. GRAME.

Witnesses:
JOSEPH P. PIRSSON, Jr.,
J. L. KINGSLEY.