

Allen & Wells,
Steam-Engine Valve-Gear.
Nº 9,582. Patented Feb. 15, 1853.

Fig: 1

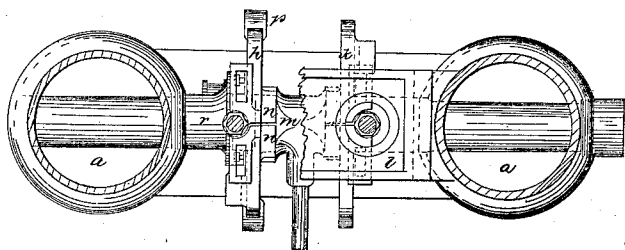


Fig: 4

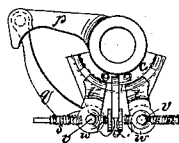


Fig: 2

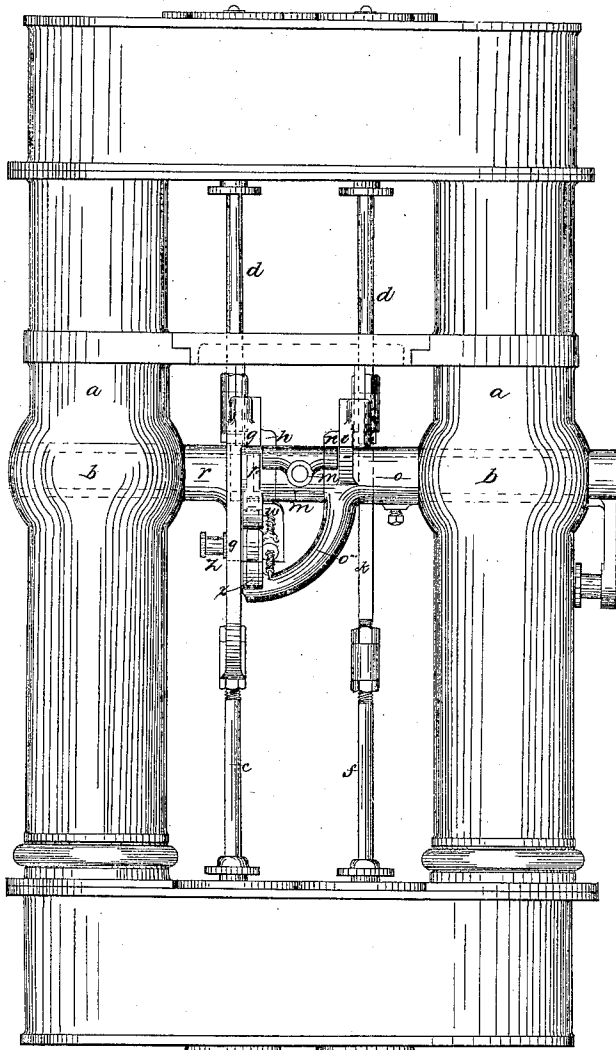
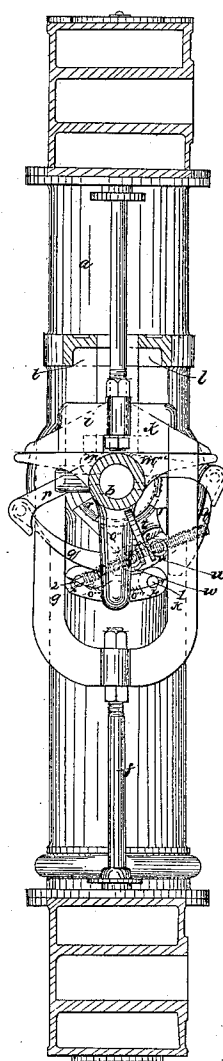


Fig: 3



UNITED STATES PATENT OFFICE.

HORATIO ALLEN AND D. G. WELLS, OF NEW YORK, N. Y.

ADJUSTABLE CUT-OFF GEARING FOR PUPPET-VALVE ENGINES.

Specification of Letters Patent No. 9,582, dated February 15, 1853.

To all whom it may concern:

Be it known that we, HORATIO ALLEN and D. G. WELLS, of the city, county, and State of New York, have made Improvements in the Valve-Gearing of Steam-Engines, of which the following is a specification.

Our improvements in valve gearing have resulted from our efforts to simplify the arrangement of cut off valve patented by Horatio Allen, one of the parties to the present specification, 6th February, 1849. In that arrangement the toes called in that patent secondary or loose toes, and the parts by which motion was given to the loose toes to raise and lower the steam valves, required several shafts to carry them.

We have been enabled to effect the desired simplicity by placing the rock shaft which carries the exhaust valve toes in the same plane with the valve stems, about midway between the upper and lower steam chests. To this rock shaft so placed, the exhaust valves toes are permanently attached. Under this shaft are placed the loose toes, or secondary toes by means of which the steam valves are operated. Motion is given to raise the loose toes by means of an arm permanently attached to the rock shaft, and to lower them by means of an arm having its center on the rock shaft, and deriving its motion from any part whose motion commences with or slightly precedes the motion of the piston rod.

For the fuller explanation of the improvement reference is made to the drawings herewith.

Figures 1, 2, 3, 4 are views of the improvement.

a, d, are the steam valve stems.

e, f, are the exhaust valve stems.

b is the rock shaft placed in the same plane as the plane of the valve stems.

o' o'' are the exhaust valves toes which through the pieces operate the exhaust valves.

p p' are the loose toes supported on the rock shaft.

o''' is an arm permanently attached to the rock shaft at the end of this arm are fastened the pieces *o''''* on which are the rollers *X X'*. The pieces and arm being permanently attached to the rock shaft, the rollers *X X'* will of course have the same motion as the rock shaft, having at the commencement of the up stroke a motion as indicated by arrow 1 and at the commence-

ment of the down stroke a motion in the direction indicated by arrow 2.

q q' are pieces called "pawls" connected with the ends of the loose toes by pins, on which they are free to turn. The lower ends of the pawls rest at the commencement of their motion against the rollers *X X'* as shown in the pawl Fig. 3, but the surface by which they rest against the rollers is an inclined one, and unless the pawls are kept from sliding the toe would not be raised when motion was given to the arm *o'''* in the direction of arrow 1.

To provide the control of the pawl there is placed on the rock shaft the arm *r*. This arm carries by means of the right and left hand screw the two rollers *W W'* and this arm is worked by a motion nearly coincident with the motion of the piston. The position of the rollers *X' W'* is such and the mutual adjustment of the pawl *q'* is such, that at the beginning of the stroke when the inclined end of the pawl rests against the roller *X'* the upper surface of the pawl will rest against the roller *W'* and as long as the roller *W'* is in contact with the upper surface of the pawl, the pawl must have the same motion as the arm. The upper surface of the pawl is circular whose radius is such that when the pawl is in its extreme outward position, the center of its circular surface is the center of the rock shaft.

The parts described being adjusted as represented in Fig. 3 and put in motion the arm carrying the roller *X'* will have a motion in the direction of the arrow 1 and the arm *r* carrying the roller *W'* will have a motion in the opposite direction as indicated by the arrow 3. It will be seen that the roller *X'* will carry up the pawl *q'* and lift the toe *p'* and thus raise the steam valve resting on it, and continue to raise it as long as the roller *W'* keeps the pawl in its place, but as soon as the roller *W'* in its motion downward ceases to be in contact with the inner and upper surface of the pawl *q'* the end of the pawl *q'* will rise on the roller *X'* and will soon be only held by the roller *W'* and as the motion of that roller is downward the pawl will no longer be raised but will be lowered with whatever velocity the roller may have.

The point at which the pawl will be disengaged from the upward action of the roller *X'* will depend on the position of the roller

W', this adjustment of the two rollers W W' forms the adjustable feature of the cut off, and is effected by placing each roller on an arm which is connected with the arm *r* by the right and left screws, by turning the screw in one direction the arms carrying the rollers W W' will be separated, and by turning them in the other direction they will be brought toward each other.

10 To provide the means of working the engine by hand there is placed on the rock shaft the piece *m* which is free to move around the rock shaft, on this piece are short projecting toes *m'* *m''* one under each of the lifters of the valve stems, the starting bar is inserted into the orifice *m'''* the piece *m* when worked in one direction will raise the steam and exhaust valves for the up stroke, and when worked in the other direction will

20 raise them for the down stroke.
What we claim and desire to secure by Letters Patent is—

1. The combination of pawls, with the two arms whereby the valves are lifted and
25 tripped as described.

2. The combination of the arms provided with rollers which in their action assist in transferring the pawls from one arm to the other, with the pawls and loose toes as described.

3. The making the rollers W W' adjustable with reference to each other by means of supporting them on independent arms and connecting them to each other and the arm *r* by means of a right and screw, where- 35 by the point of cut off may be altered.

4. The mode of operating the loose toes by means of pawls and rollers substantially as herein described and represented.

5. The mode of working the valves by hand by means of toes supported on the rock shaft substantially as herein described and represented.

New York Jan. 26, 1853.

HORATIO ALLEN.
D. G. WELLS.

In presence of—

CHS. A. DU VIVIER,
HENRY A. V. POST.