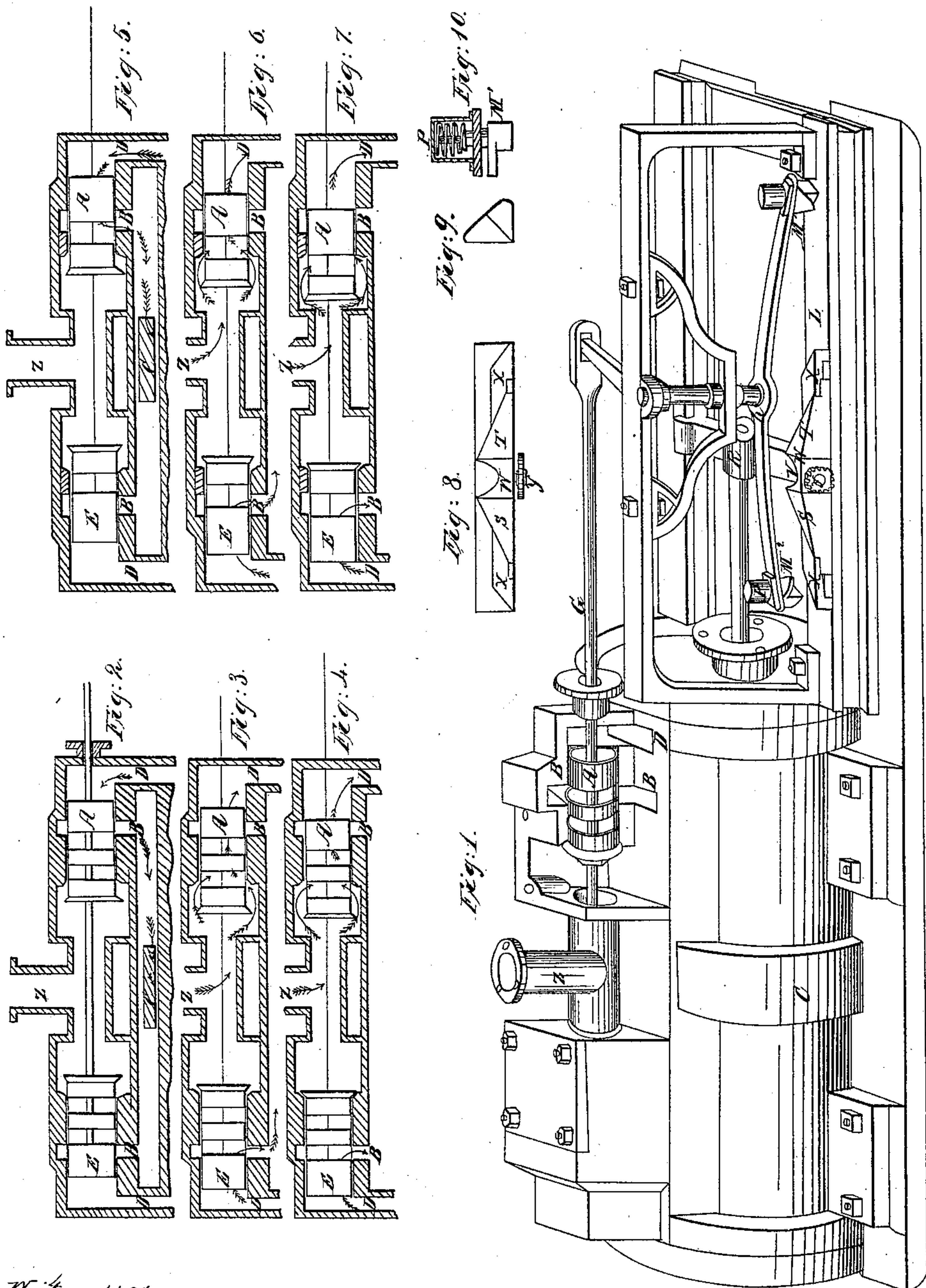


Stott & Ferguson, Steam-Engine Valve-Gear.

N^o 13,276.

Patented July 17, 1855.



Witnesses:

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JOHN B. STOTT AND ALEXANDER FERGUSON, OF TROY, NEW YORK.

CROSS-HEAD ATTACHMENT FOR WORKING STEAM-ENGINE VALVES.

Specification of Letters Patent No. 13,276, dated July 17, 1855.

To all whom it may concern:

Be it known that we, JOHN B. STOTT and ALEXANDER FERGUSON, of the city of Troy, State of New York, have invented a new
5 Method of Operating the Valves of the Cylinders of Steam-Engines, which we call "Stott and Ferguson's Cross-Head Attachment Valve-Cam;" and we declare the following specification, with the drawings at-
10 tached hereto as part of the same, to be a full and perfect description thereof.

Figure 1 represents in perspective a view of the upper part of a steam cylinder with the apparatus for operating the valves at-
15 tached, and with a portion of the upper valve chamber removed in order to afford a view of the working of the valve. Figs. 2, 3, 4, 5, 6, 7 are diagrams showing the various positions of valves as produced by the con-
20 secutive actions of the operating apparatus. Fig. 8 is a plan view of the crosshead attachment. Figs. 9 and 10 a plan (reversed) and profile of the cam.

Similar letters in the figures denote the
25 same parts of the apparatus.

In Fig. 1 A represents the steam valve next the cylinder head. It is a hollow piston closed tight at the end toward the center of the cylinder. It moves within a hollow
30 cylindrical casing to which it is fitted steam-tight by metallic rings or otherwise (being what is usually known as a piston valve). It has slots cut around through its shell to afford a communication between its in-
35 terior and the port B which communicates with the eduction channels C C, the communication with the steam port D being through its open end as shown in the drawing. This valve has (as usual) its counter-
40 part within valve box E to make the communication with the steam and eduction ports at the lower end of the cylinder, the two valves being connected by a stem G (which passes when the valves are in sep-
45 arate chests through a pipe connecting them); the steam from the boiler being introduced either through this pipe, or into one of the valve chests.

The stem G is prolonged through a stuff-
50 ing box, and extended to connect with the apparatus which operates the valves; and which apparatus is arranged as follows: A lever or arm H passes at its outer end into a loop on the end of the stem G, or is linked
55 to it in any of the usual methods of attachment. Its inner end is pinned to a vertical

shaft J, supported properly by a framing, as shown in the drawing, upon or over one of the cross-head-slides L. To the lower end of this shaft a double-arm K is secured so as
60 to traverse just above the slide L. At each end of the arm K is a stop or cam M¹, M², hanging therefrom, of peculiar form as shown on Fig. 9 (which is a sketch of M¹ turned over on its back, and Fig. 10 which
65 is a sectional profile,) having an oblique face to press against a corresponding face on a sliding trip which is to operate it, and a projecting lip to pass it over an inclined
70 plane of the same trip. The stop M is attached to the arm K by a vertical spindle which passes up through it, into a box P, Fig. 10, within a spiral spring which keeps the stop habitually down a small distance
75 below the arm.

The operating apparatus is attached to the end of the cross-head R so as to slide forward and backward along or upon the frame or slide L, to the extent of the stroke of the piston of the engine. It consists of
80 an irregularly shaped box W as shown in perspective in Fig. 1 and in plan in Fig. 8. Its center is square, its extremities S and T tapering both on the top and on the inner side, and it has a double tapering or curved
85 recess V on the inner side of its central part. Within this box lying in line with each other and parallel with the movement of the piston, are two square bars X X, whose outer ends are made tapering vertically
90 from their outer angles inwardly. These bars are connected together by a right and left threaded screw passing or tapped through their rear ends, said screw being
95 operated by a thumb screw Y working an instep screw wheel (or analogous device) by turning which the bars can be projected from or drawn near to each other.

The operation of the apparatus is thus: The position of the valve A and the arm K
100 being as shown in Fig. 1, and the steam admitted through the steampipe Z, it enters the steamchests behind the valves, and passes down, through the valve in chest E, which is wide open (as will be understood by ex-
105 amining the diagrams illustrating the next motions of the valves) and through the steamport into the cylinder below the piston, while at the same time the steam above the piston passes up through the interior
110 of the valve A and down through the wide open port B (as shown by the arrows) into

the eduction channel C. Consequently the piston with its cross-head moves up until the inclined end of bar X reaches the stop or cam M¹ which it presses aside, moving 5 the arm K, shaft J, lever H and rod G, a little from right to left, shifting the valve so as to place it as in diagram 2 closing the steam passage by the lower valve E and nearly closing the eduction passage by the 10 valve A. The continued expansion of steam and momentum of piston continue its motion until the edge of T touches M which it moves a little farther back carrying the valves to the position shown in diagram 3 15 when the eduction passage is closed by valve A and the steam passage of the same valve slightly opened, at the same time the eduction passage at the other or lower end of the cylinder is partially opened by valve E. 20 This occurs just as the piston arrives at the end of the up stroke. At the same time that the vertical face of M¹ presses against the face of T, the projecting lip overlying the upper oblique surface of T slides over it 25 raising M¹ vertically against its spiral spring until it reaches the recess V when it drops into it just at the close of the piston's stroke. The movement of the piston becomes now reversed from top to bottom of 30 the cylinder, and as it progresses, the right hand oblique edge of the recess V presses the lip of the cam outward through K one move farther back to the position shown in diagram 4 opening wide the steam passage 35 in valve E and the eduction passage in valve E giving full effect to the steam. It will be seen that the valves are now in the position of the downward stroke, relatively, that they were to the upward stroke in Fig. 40 1, and that as the left hand bar X with the other apparatus of W operate against the cam M² a series of operations corresponding with those just described will take place in reference to the downward stroke of the 45 engine, and duly shift it to a second upward stroke.

The function of the bars X being to cut off the steam before the termination of the

stroke, and it being desirable, under varying circumstances of pressure of steam, rapid- 50 ity of movement, on the economical use of expansive steam, to vary the point of cut off, the advantage of the arrangement to vary the distance between the extremities of the bars X will be understood and the simple 55 means by which it can be done by the turning of the thumb screw Y.

Figs. 5, 6, 7, show another and simpler division of the valves, in reference to the arrangement of steam ports, and giving bet- 60 ter openings than those described, but their operation is precisely the same with those of 2, 3, 4, as will be seen by comparing the diagrams.

We claim— 65

The method of operating the valves of steam cylinders by the process described in the above specification, to wit, by a series of trips attached to and sliding with the cross head of the piston, which trips operate 70 in succession upon the arms of a vibrating shaft connected with the valve rod, through cams fixed near the ends of the arms; the trips themselves consisting of a variable and adjustable one to move the valves so as to 75 cut off the steam before the end of the piston's stroke, leaving the eduction passage slightly open; a second to shift the valves a little farther at the end of the stroke so as to take steam for the new stroke, and open 80 wider the eduction passage, and a third to shift the valves so as to open the induction and eduction passages to their fullest extent; the two first movements of the valves being made by the movement of the cross- 85 head in one direction, and the other by the reverse movement thereof, the last operation being produced by the joint action of the spring-cam on the arm K and the recessed trip V substantially as set forth herein. 90

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