(No Model.)

E. G. DAVIS.

SLIDE VALVE FOR COMPOUND ENGINES.

No. 279,544. Patented June 19, 1883.

Fig. 1.

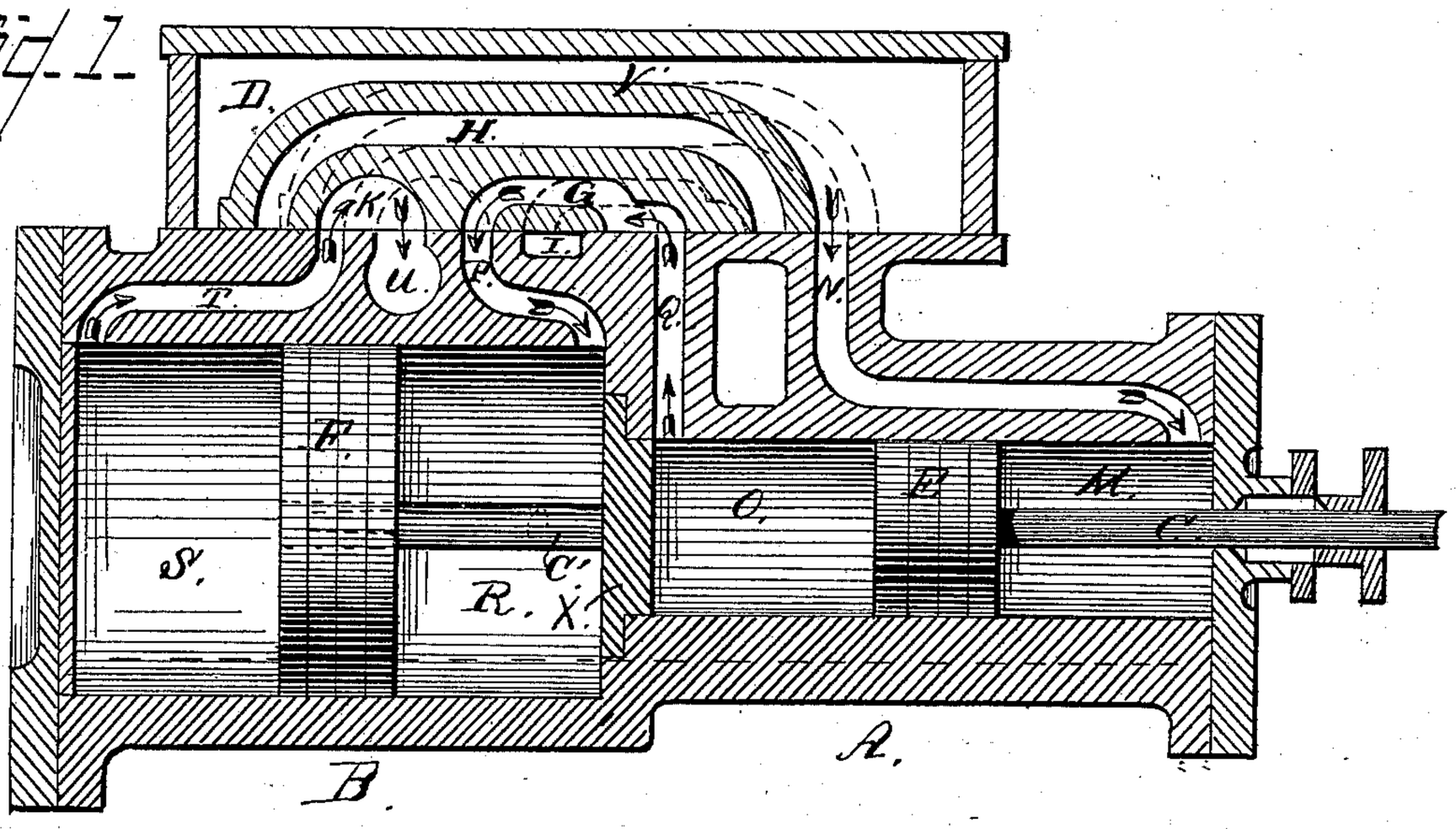


Fig. 2.

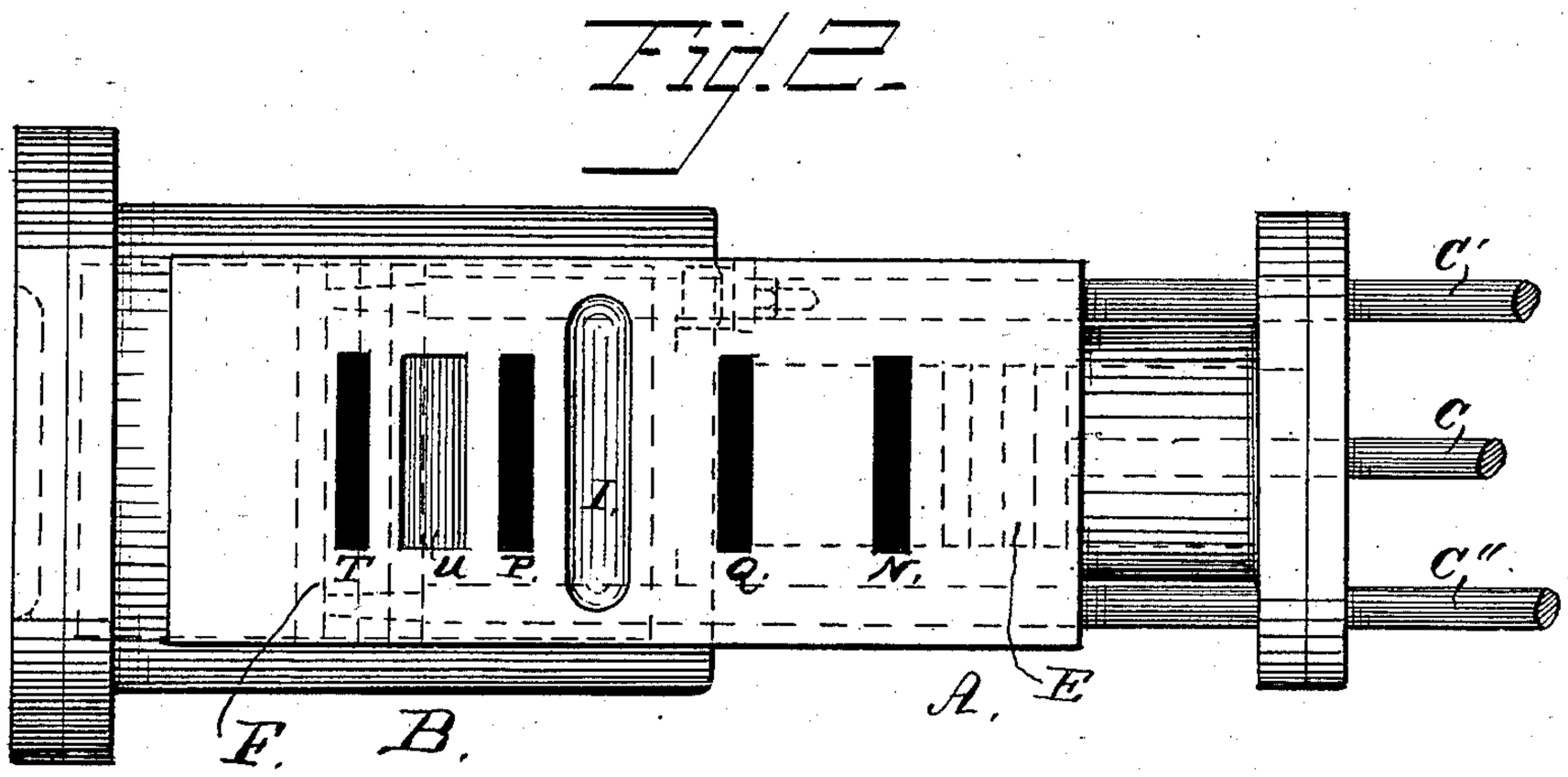
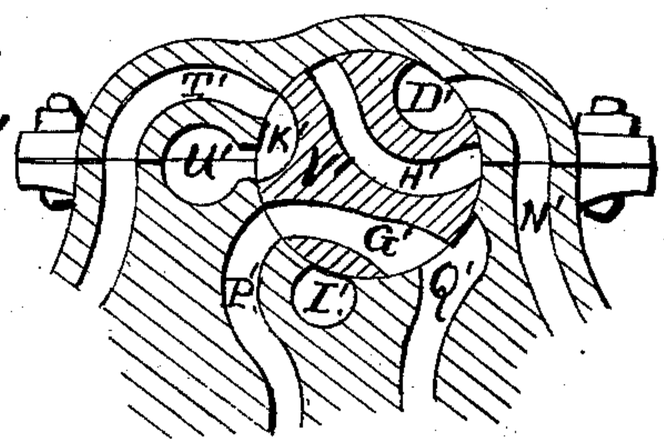


Fig. 3.



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EDWARD G. DAVIS, OF ST. LOUIS, MISSOURI.

SLIDE-VALVE FOR COMPOUND ENGINES.

SPECIFICATION forming part of Letters Patent No. 279,544, dated June 19, 1883.

Application filed April 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWARD G. DAVIS, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Compound Steam-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention is an improvement in slide-valves for compound steam-engines of the class in which the steam expands in two stages in separate cylinders; and it consists in a valve arranged to feed live steam to one cylinder, then transfer it to the other to complete its expansion, and thus to discharge the expanded steam into the exhaust.

The invention, in part, is the same shown in my patent of March 27, 1883, No. 274,571, with modifications of the same, and it is made and used substantially as set forth hereinafter, and as shown in the drawings, in which—

Figure 1 is a vertical section of the engine. Fig. 2 is a plan view of same with the valve removed, showing ports; and Fig. 3 is a cross-section of a modification of the valve.

The two cylinders A B, of unequal cross-section and equal lengths, are connected together in line, as shown. They have each a piston-head, E F, on different piston-rods C C′ C″, which may be connected to work together on one cross-head or otherwise. The steam-chest D extends over the central portion of the two cylinders, as shown, with a valve, V, therein. This valve has separate passage-ways H G through it, and a cavity, K, as shown, with ports arranged, when in one position, (shown in full lines in Fig. 1,) to connect with the ports N Q P T, the inlet I, and the outlet U in its seat, as shown, and it is adapted to be moved so as to register, as shown in dotted lines. The valve has its ports all in one face and in one plane, so as to be easily fitted to its seat and kept true. This face is flat, as in Figs. 1 and 2; but it may be made cylindrical, as in Fig. 3, and have its seat curved to conform to it. In the one case it is moved straight back and forth, and in the other case it is moved with a rocking motion in close journal-bearings, so as to bring the ports to connect in the same way in each case. Live steam from the steam-chest D, or the steam-passage D′, as in Fig. 3, enters the outer end chamber, M, of the smaller cylinder, A, by the port N or N′ and its passage, when the valve is in the position shown in full lines, so as to push the piston-head E to the opposite end of the cylinder. At the same time the partly-expanded steam from chamber O of this same cylinder A passes by port Q or Q′, passage G or G′, and port P or P′ to chamber R in cylinder B to push the piston-head F in the same direction as head E with a force equal to the difference of cross-section area of the two cylinders. At the same time the expanded steam from chamber S in cylinder B escapes by port and passage T or T′ and cavity K or K′ to the exhaust-passage U or U′, which has suitable outlet. (Not shown.) At the end of the stroke the valve is shifted to the position shown in dotted lines in Fig. 1, or to a corresponding position in Fig. 3, so as to change the connections of the ports and passages.

If it is desired to work the steam to some extent expansively in cylinder A, the spaces in the valve between its ports are made larger than shown, and the valve is moved with two motions—one to cut off the connection of the ports and the other to reverse to the position shown in dotted lines. When in position shown in dotted lines in Fig. 1 and a corresponding position in Fig. 3, the live steam will pass by channel I or I′ from the steam-chest or steam-source by passage G or G′ and port Q or Q′ to chamber O of cylinder A to push the piston-head E back again to the other end of the cylinder A. At the same time the partly-expanded steam will pass from chamber M by port N or N′ through passage H or H′ and port and passage T or T′ to the outer end of cylinder B to chamber S to push the piston-head F back again to the other end of the cylinder B, and at the same time the expanded steam will pass from chamber K by port P or P′ and cavity K or K′ to the exhaust-passage U or U. At the end of this stroke the valve is moved to its first position again, as shown in full lines.

If it is desired, the two piston-heads can be connected by their rods to separate cranks on the same shaft, so that one will start on its stroke a little in advance of the other to avoid dead-centers by making and moving the valve

to suit; or they might be connected to different shafts and operated by connecting the valve so as to be moved by one or by both to secure unison of action.

The several passages in the valve are separate and simple. The passage of the steam in each case is made as short and direct as practicable. When made as in Fig. 3 the arrangement can be made to correspond with that in my former patent referred to herein, and various other modifications can be made in the valve and the engine when desired. The two cylinders are made and bored out as one chamber, and a head, X, inserted to separate them; or they could be set apart with an interspace, as in my former patent, or otherwise arranged.

I reserve the privilege of using any of the subject-matter shown in this case in one or more future applications, and to claim therein any thing which might be but which may not be fully patented in this case.

I claim—

1. In a compound engine, a valve provided with two separate passages, H G, arranged to transfer partly-expanded steam from one cylinder to the other, and to admit live steam to the first cylinder, and with an open cavity, K, to transfer expanded steam from the second cylinder to the exhaust, substantially as set forth.

2. In a compound engine, a slide-valve provided with two separate passages, H G, having their ports in one plane, arranged with the cylinder-ports to transfer partly-expanded steam from one cylinder to the other, and to admit live steam to the first cylinder, and with open passage K to transfer partly-expanded steam from the last cylinder to the exhaust, substantially as set forth.

3. In a compound engine having two cylinders connected and provided with separate piston-rods, a valve having separate passages to transfer partly-used steam from the opposite ends of one cylinder to the opposite ends of the other, and to admit live steam to one cylinder, and expanded steam from the other to the exhaust, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD G. DAVIS.

Witnesses:
S. S. VAIL,
JOHN DOWLING.