

(No Model.)

2 Sheets—Sheet 1.

C. S. CRANE.  
REVERSING VALVE.

No. 279,921.

Patented June 26, 1883.

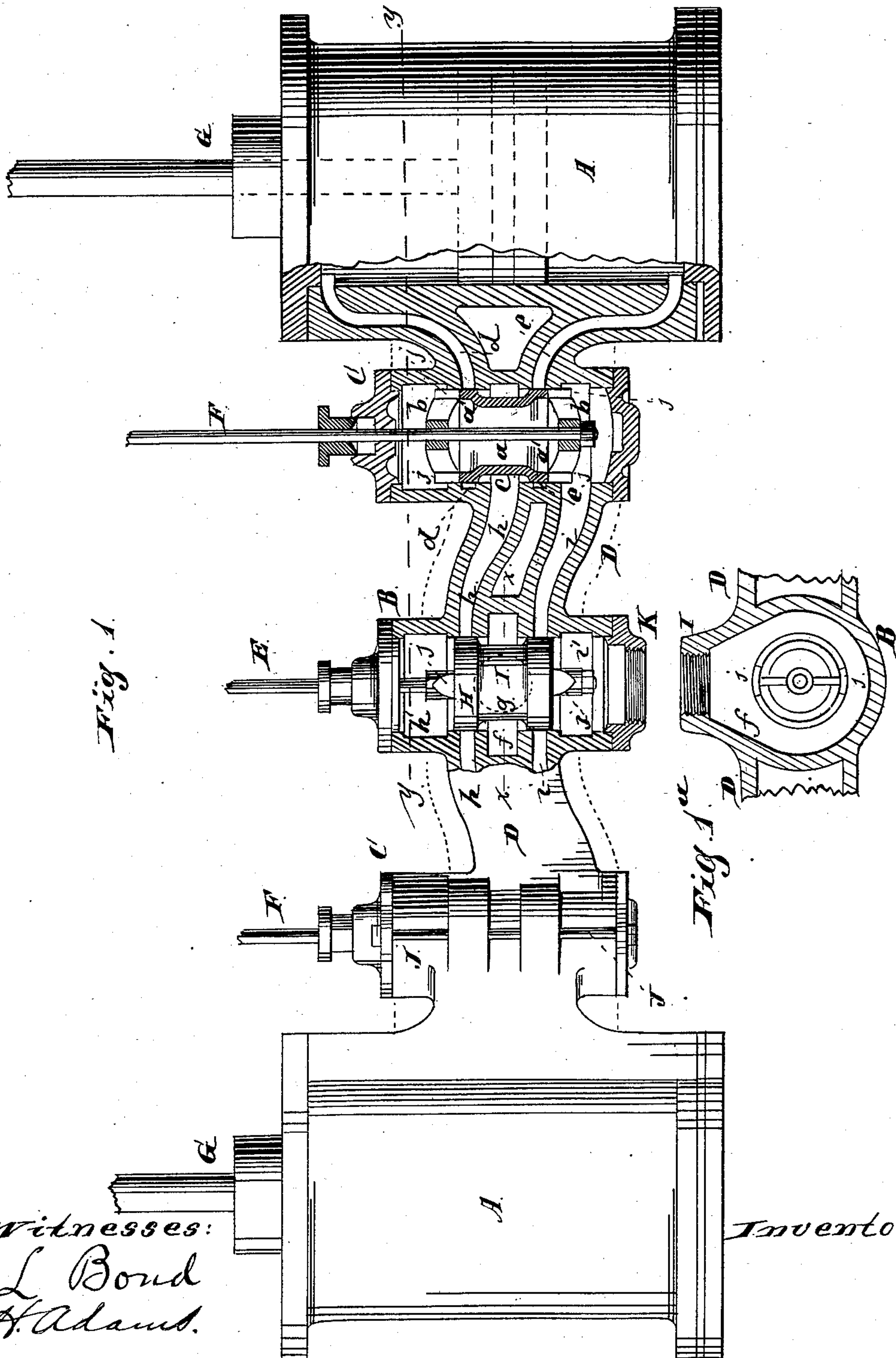


Fig. 1.

Fig. 1<sup>a</sup>.

Witnesses:  
L. L. Bond  
A. H. Adams.

Inventor:

Charles S. Crane

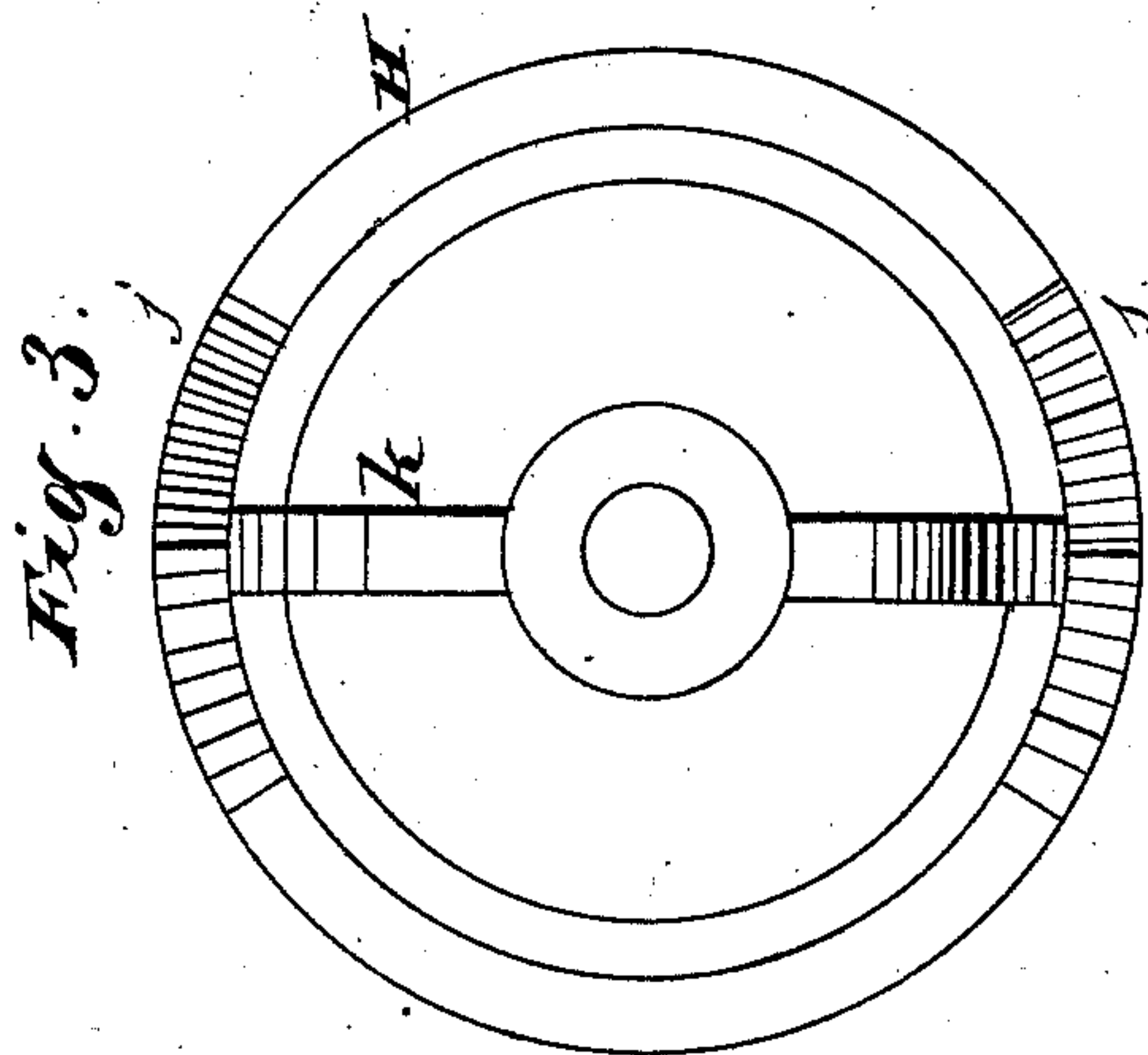
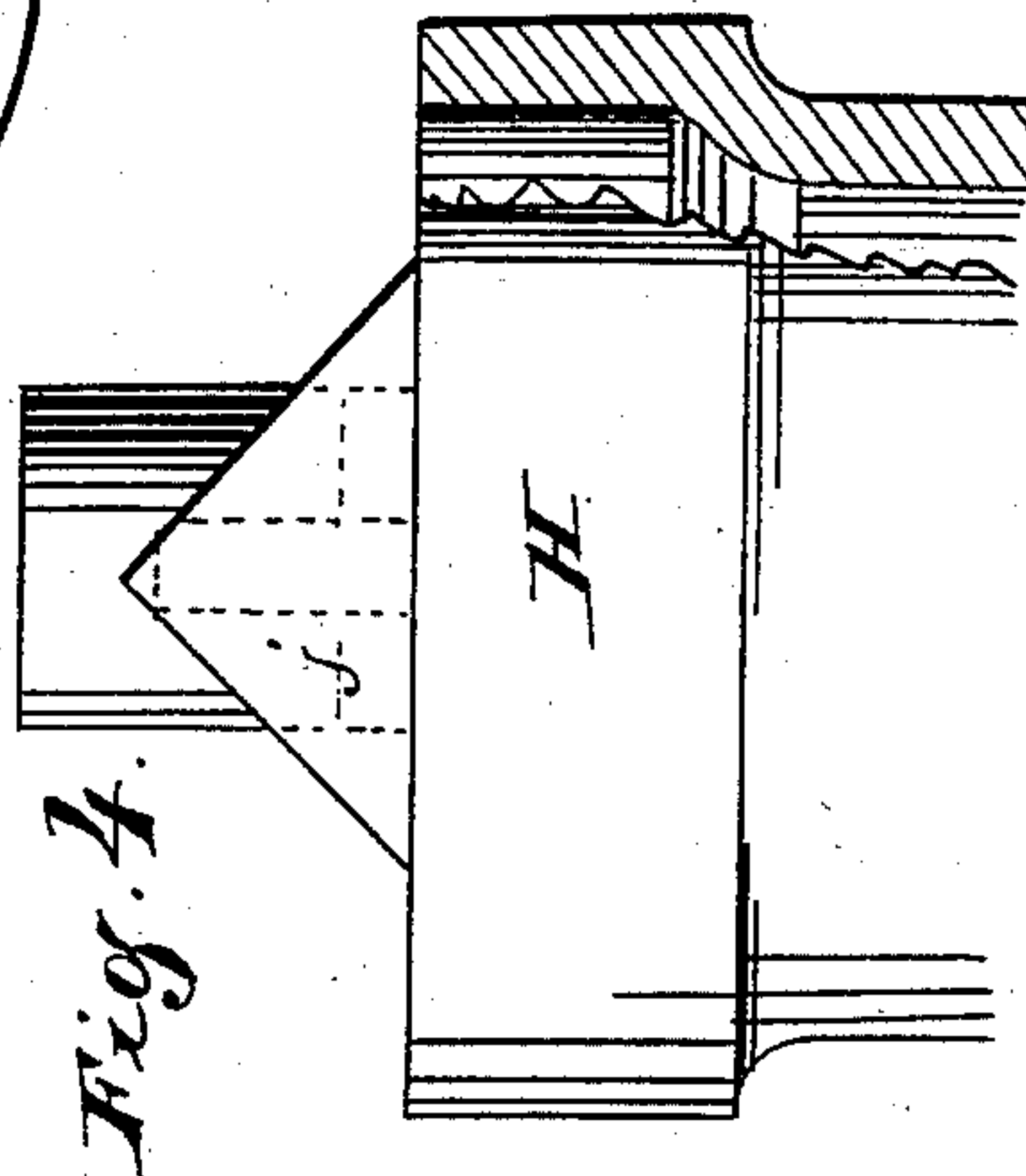
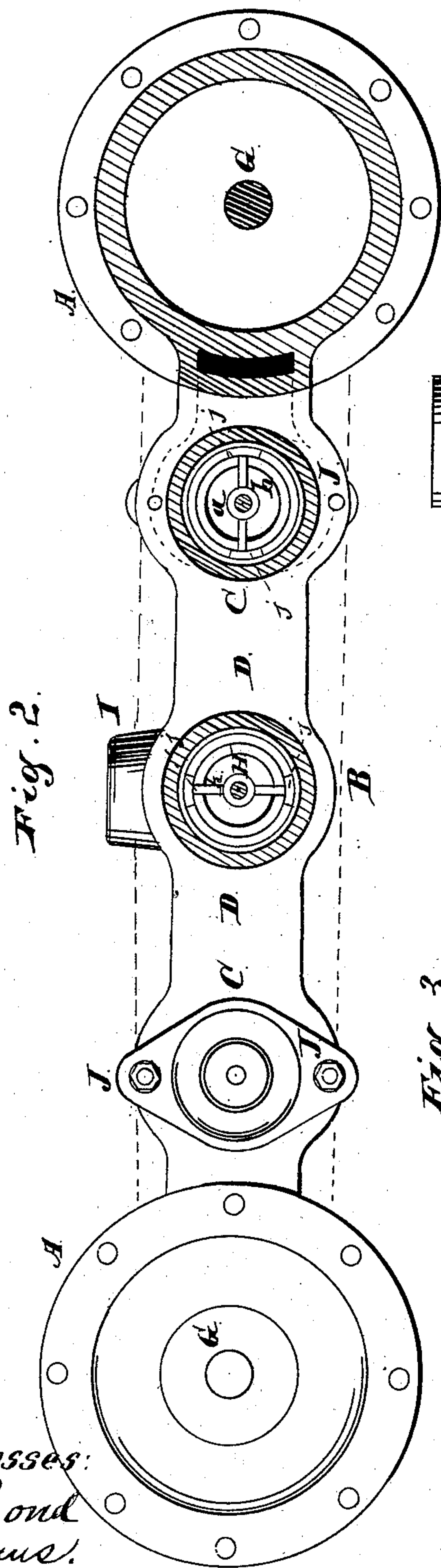
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# UNITED STATES PATENT OFFICE.

CHARLES S. CRANE, OF CHICAGO, ILLINOIS.

## REVERSING-VALVE.

SPECIFICATION forming part of Letters Patent No. 279,921, dated June 26, 1883.

Application filed January 23, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES S. CRANE, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented new and useful Improvements in Reversing-Valves for Steam-Engines, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section; Fig. 1<sup>a</sup>, a partial cross-section on line *xx* of Fig. 1; Fig. 2, a top or plan view, partly in section on line *yy* of Fig. 1; Fig. 3, a top or plan view of the reversing or change valve; and Fig. 4, a side view of the upper end of said valve, partly in section.

The object of this invention is to simplify the arrangement of the ports and valves of a steam-engine, to improve the action and operation of the valves, and to improve the connection between double engines. These objects I accomplish by the construction and arrangement of parts hereinafter described and claimed, and illustrated in the annexed drawings.

In the drawings, A indicates the cylinders; B, the casing of the change-valve; C, the casings of the cylinder-valves; D, casings between the partly-circular casings B and C; E F, valve-rods; G, piston-rods; H, the reversing or change valve; I, connection for the steam-pipe; J, rods or bolts for attaching the end plates of the valve-casings or steam-chests; K, exhaust port or connection for an exhaust-pipe; *a*, the cylinder-valves; *a'*, end lines, or ends of the continuous pipe or shell of which the valve *a* is formed; *b*, bridges at the ends of the cylinder-valves; *c*, annularly-depressed portion of the cylinder-valve; *d e*, steam ports or passages between the cylinder-valves and the cylinders; *f*, steam passage or chamber around the valve H; *g*, middle contraction of valve H; *h i*, steam-passages between the valves H and *a*; *h' i'*, chambers at the ends of valve H; *j*, triangular projections on the valves H and *a*; *k*, bridge of the valve H.

The cylinders A, with the steam passages or ports *d e*, are of the ordinary form, except that the steam-passages are made to extend around the cylinder-valves.

The casings C are cylindrical in the interior,

and the interior is somewhat larger at the ends than it is at the middle, as shown in Fig. 1. The two casings C, with their ports, and the valves *a*, are alike, so that the description of one will answer for both. The valve *a* is a pipe-valve or a hollow or tubular valve. Its ends are provided with the bridges *b*, which connect at their inner ends with collars, whereby they are suitably attached to the rod F, and they are so far curved that the inner edges of the bridges *b* are above the lines *a'*. By making the bridges in this manner, the steam can pass under them to the ports without having to make any abrupt or short turn. Midway of the length of this valve it is contracted in order to increase the capacity of the steam-passage *h* and to make less friction-surface. The valve H is similarly constructed to increase the capacity of the steam chamber or passage *f*. This valve is also tubular, and the valves are all provided at their ends with angular projections *j*, which are arranged to give the ports or passages *h i* a more gradual opening than would otherwise occur, and they are long enough to prevent the valves from catching on the ports or passages.

As shown, the cylinders and cases C and B, with their connections D, are all cast together, the passages being cored out in the form and position shown for double engines, and in this respect I have made some improvements; but I do not limit my other improvements to casings made in this manner, as they may be used in places where it is not essential that the casings be so made, for the cylinders may be spread any distance, and the casings B and C be connected with pipes instead of the continuous casting, and when connected with pipes it is not essential that the cylinders be placed in the same elevation, or in the relation to each other shown in the drawings.

For some purposes it will be desirable to incase the valve-casings, or to form a steam-jacket around them to prevent the sticking of the valves. For this purpose additional casings will be located, as shown by the dotted lines, Figs. 1 and 2, it being understood that suitable flanges will be cast on the part shown to make the proper connections for the casing or steam-jacket. When the parts of the casing, with the exception of the heads, are cast to-



gether, they are made by using a continuous core, or by making two which meet in the middle of the casing B. The benefit of this is that there will be no breaks or joints in the steam-passages.

In operation the steam enters the passage or chamber *f*, and, as shown, the valve H closes both passages *h* and *i*. By raising the valve H the passage *h* is opened, and steam enters it and the passage around the valves *a*, and the cylinders take steam from the middle passage or chamber around the valve *a*, which runs the engine in the forward direction, while the exhaust will pass through the center of the valve *a*, down and out of passage *i* into the chamber *i'* and out at the exhaust K. Now, to reverse the engine, move the valve H down, and the steam then enters port *i* to the steam-valve *a*, and the cylinder takes its steam at each end of the valve *a*, while the exhaust passes the middle of the valve and out at port *h* into the chamber *h'*, and through the valve H to exhaust K. The steam may be admitted at K and exhausted at I and produce the same but a reverse result. By connecting the passage *i* with the upper end of the casing C by an additional passage, then either passage *i* or *h* may be used for steam and exhaust, according to the movement of the valve H; but I do not deem this necessary, for the reason that by using the pipe or tubular valves the steam is connected with the upper end.

With the exception of casting the cylinders and valve-casings or steam-chests in one piece with the cored passages or ports, I do not limit the use of my improvements to double engines,

as all of the other implements are applicable to single engines.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. The cylinders A A, casings C C, central casing B, and casings D D, interposed respectively between the central casing and the casings C C, said parts being cast integral, and the interposed casings each having the two passages *h* and *i*, the central casing having the center chamber, *f*, and end chambers, *h'* and *i'*, and the cylinders having the ports *d* and *e*, the whole being constructed and relatively arranged, substantially as and for the purpose described.

2. The tubular valve H, provided with angular projections *j*, in combination with the passages *h'* and *i'*, substantially as and for the purpose set forth.

3. The tubular valve H, provided with angular projections *j*, in combination with the chamber *f*, passages *h* *i*, tubular valve *a*, and passages or ports *d* *e*, substantially as and for the purpose set forth.

4. The projections *j*, in combination with a tubular valve and a steam chest or casing having annular passages or ports for the more gradual passage of steam, and preventing the catching of the valve on the ports, substantially as described.

5. The arms or bridges *b*, curved beyond the lines *a'*, in combination with the tubular valve *a*, substantially as specified.

CHARLES S. CRANE.

Witnesses:

L. L. BOND,  
ALBERT H. ADAMS.