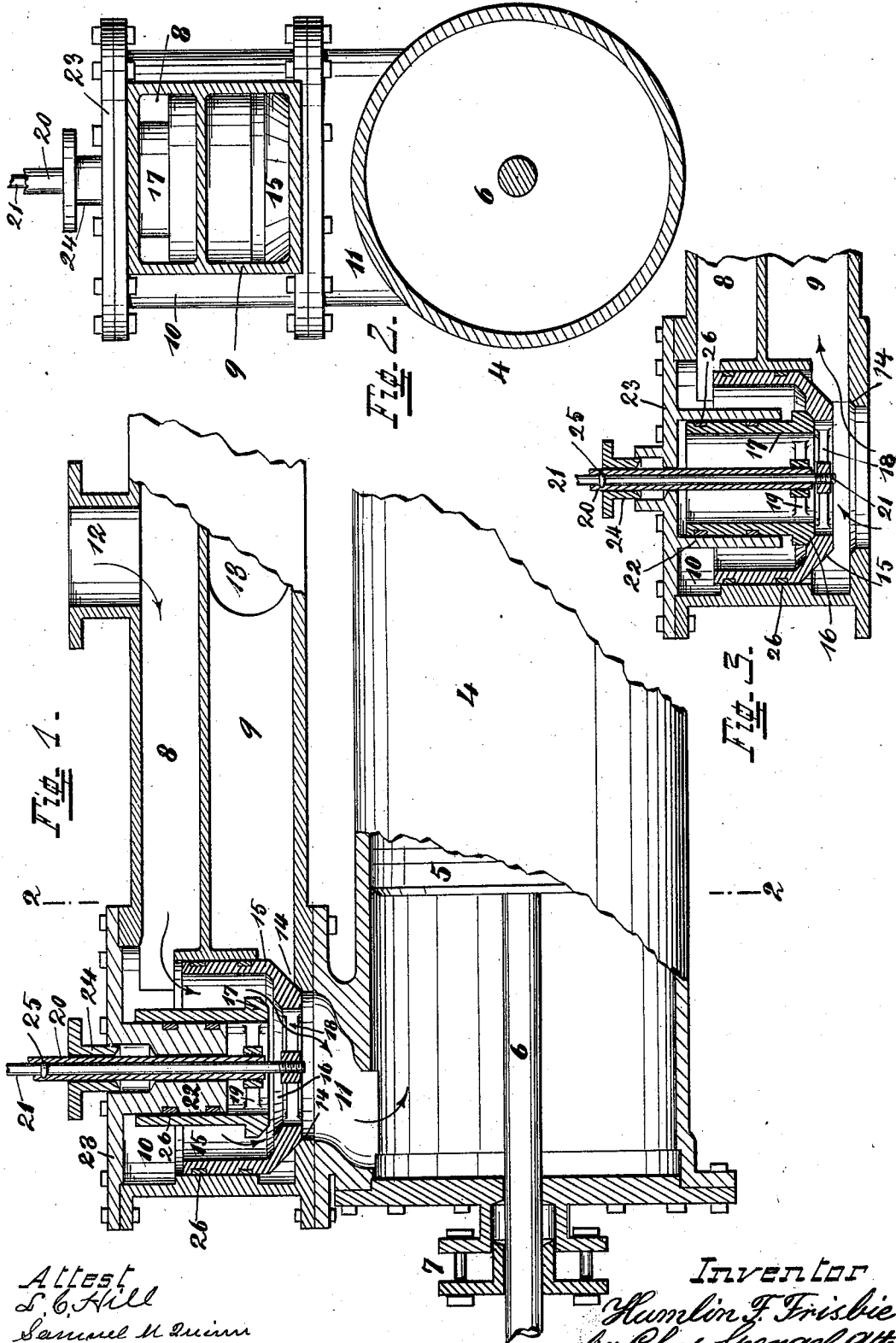


(No Model.)

H. F. FRISBIE.
VALVE FOR STEAM ENGINES.

No. 486,099.

Patented Nov. 15, 1892.



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UNITED STATES PATENT OFFICE.

HAMLIN F. FRISBIE, OF COVINGTON, KENTUCKY.

VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 486,099, dated November 15, 1892.

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To all whom it may concern:

Be it known that I, HAMLIN F. FRISBIE, a citizen of the United States, residing at Covington, in the county of Kenton and State of Kentucky, have invented certain new and useful Improvements in Valves for Steam-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in valves for steam-engines and similar motors, and it relates particularly to the class of so-called "puppet-valves."

It may be mentioned here and in general that the valves here in view are those which regulate the steam-supply to the cylinder and its exhaust therefrom. Where such puppet-valves are used on steam-engines they are generally disposed at each end of the cylinder, there being a supply and an exhaust valve at each end, respectively. Each valve is of course provided with its own steam-chest and the requisite passages leading to and from it. I propose to devise a construction by which the two valves at each end of the cylinder are so disposed that only one steam-chest is required for them, whereby the general construction and casting of these parts are greatly simplified, the engine made more compact, and the steam-chest brought closer to the cylinder, whereby passages and spaces filled with steam are greatly reduced and the chances for condensation correspondingly lessened. I accomplish this substantially by the use of a double valve—that is, two valves, one placed on or within the other and one forming the valve-seat and part of the steam-chest to the other valve. I also use one of the valves, aided by the steam-pressure lying behind it to keep the other one in position and down on its seat. The construction by which these effects are attained is described in the following specification, and pointed out in the claims concluding it, as well as illustrated in the accompanying drawings, in which—

Figure 1 shows a part of a steam-cylinder

and adjacent parts in a side elevation, partly in section on a vertical central line and the supply-valve raised to admit steam to the cylinder. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is a view similar to Fig. 1 without the steam-cylinder and the exhaust-valve raised.

4 is a steam-cylinder; 5, its piston; 6, the piston-rod, and 7 the stuffing-box in the cylinder-head. On the top of the cylinder are the side pipes 8 and 9, the former supplying live steam to the cylinder and the latter conveying the exhaust from it. The two enter into the steam-chest 10, and from here by a port 11 communicate with the steam-cylinder. The live steam enters the one side pipe through a suitable steam-pipe at 12, and the exhaust escapes through an opening 13 in the other side pipe. Steam-chest 10 is provided with an annular valve-seat 14, onto which a valve 15 fits. This valve has an interior valve-seat 16, which receives another valve 17. These valves are of the well-known puppet-valve type and provided with spiders 18 and 19, each of which supports a central boss or hub to which the respective valve-stems are secured. The valve-stem 20 of valve 17 is hollow to permit the stem 21 of valve 15 to pass through it. The upper ends of these valve-stems are connected to any suitable mechanism actuated by cams and rock-shafts, which are operated from the main driving-shaft and by which the valves are lifted and dropped in the customary manner. This mechanism does not form a part of this invention and therefore is not shown. Valve 15 is guided by a part of the interior surface of steam-chest 10, which surface is preferably raised off of the balance, and valve 17 is guided by a boss 22, which occupies its interior and which depends from the under side of cover 23 of the steam-chest. In addition to serving as a guide to valve 17 boss 22 also serves to fill out a part of the valve-chest which otherwise would be unnecessarily filled with steam subject to condensation, and, lastly, it forms a head to the hollow valve, with the advantage, however, that it takes the weight and pressure of the live steam off of the valve, inasmuch as it forms no part of the same.

24 is a stuffing-box to prevent leakage at the points where the valve-stems pass through

the cover of the steam-chest. Another stuffing-box or suitable packing 25 is also provided between the valve-stems. Customary packing-rings 26 are provided interiorly to prevent leakage between the valves and the surface on which they move. All these parts are exactly duplicated at the other end of the side pipe and cylinder and connected in the same manner, but on account of limited space have been omitted in the drawings.

When live steam is to enter the cylinder, valve 17 lifts alone, as shown in Fig. 1, while valve 15 keeps its seat held down by its actuating mechanism and by the pressure of the live steam which lies against it. When the cylinder is to exhaust, the two valves lift together, as shown in Fig. 3, permitting the steam to escape through port 11, side pipe 9, and opening 13, and no steam passes between them, valve 17 being held close to its seat on valve 15 by the pressure of the live steam. It will be observed that the supply and exhaust side pipes 8 and 9 are combined in one casting and at each of their ends enter one steam-chest common to the two, thus doing away with the extra steam-chests which formerly were provided for each end and for each of these side pipes, thereby greatly simplifying the casting and manufacture. The chances for waste by condensation of the steam have also been greatly reduced by this reduction in the spaces and passages which the omitted steam-chests possessed, and all together a more compact, economical, and cheaper engine has been produced. All the side pipes and steam-chests may and are preferably combined in one casting.

The valves might be reversed—that is to say, valve 15 might control the steam-supply and valve 17 be used for the exhaust. In such reversal, however, the assistance which the live steam furnishes to keep the valves seated would be lost and additional means for such purpose would have to be provided.

In Fig. 3 the construction is slightly modified as to the manner of guiding valve 17. Boss 22, depending from the under side of the steam-chest cover, is made hollow and occupied by this valve, which in this case is guided by the interior in place of the exterior surface of the boss.

Having described my invention, I claim as new—

1. In a steam-engine, the combination of a steam-chest, a supply and exhaust pipe communicating with it, a valve inside of this steam-chest controlling the passage of live steam through the steam-chest to the steam-cylinder, and another valve controlling the exhaust from the cylinder, one of these valves being seated on the other, all substantially as shown and described.

2. In a steam-engine, the combination of a combined supply and exhaust side pipe, a steam-chest at each end of it communicating with and common to the two branches of the side pipes, all these parts constructed in one

casting, and valves located within the steam-chests and controlling the passage of steam between them and the side pipes, all substantially as shown and described.

3. In a steam-engine, the combination of supply and exhaust side pipes and a valve controlling each side pipe, the valve of the former being seated on the valve of the latter side pipe, which construction and disposition admits of the pressure of the live steam being utilized for the purpose of keeping the valves seated, all substantially as shown and described.

4. The double puppet-valve consisting of the two puppet-valves seated on each other—that is, one providing the valve-seat for the other—the two so constructed, disposed, and connected as to be capable of joint and independent movements and by which movements the supply and exhaust to and from the steam-cylinder are regulated, all substantially as shown and described.

5. In a steam-engine, the combination of supply and exhaust side pipes, a steam-chest with which they communicate, and a valve for each side pipe, controlling its communication with the steam-chest, one of these valves being provided with a valve-seat to receive the other valve, one of the valves being guided by a part of the interior surface of the steam-chest, the other by a boss depending from the underside of the cover of the steam-chest, all substantially as shown and described.

6. The double puppet-valve consisting of two puppet-valves seated on each other, each provided with its own valve-stem, by which they are made capable of joint and independent movements for the purpose of regulating the steam supply and exhaust, all substantially as shown and described.

7. The double puppet-valve consisting of two puppet-valves seated on each other, each provided with its own valve-stem, one of which passes through the other, the valves and connections being so constructed as to be capable of joint and independent movements for the purpose of regulating the steam supply and exhaust, all substantially as shown and described.

8. A double valve for steam-engines, consisting of a steam-chest provided with an interior valve-seat, a valve fitting this seat and having also a valve-seat, and another valve fitting the seat on the valve first mentioned, all substantially as shown and described.

9. A double valve for steam-engines, consisting of a steam-chest provided with an interior valve-seat, a valve fitting this seat and having also a valve-seat, and the central boss closing the upper end of the inner valve, all substantially as shown and described.

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

HAMLIN F. FRISBIE.

Witnesses:

SAMUEL M. QUINN,
CHAS. SPENGLER.