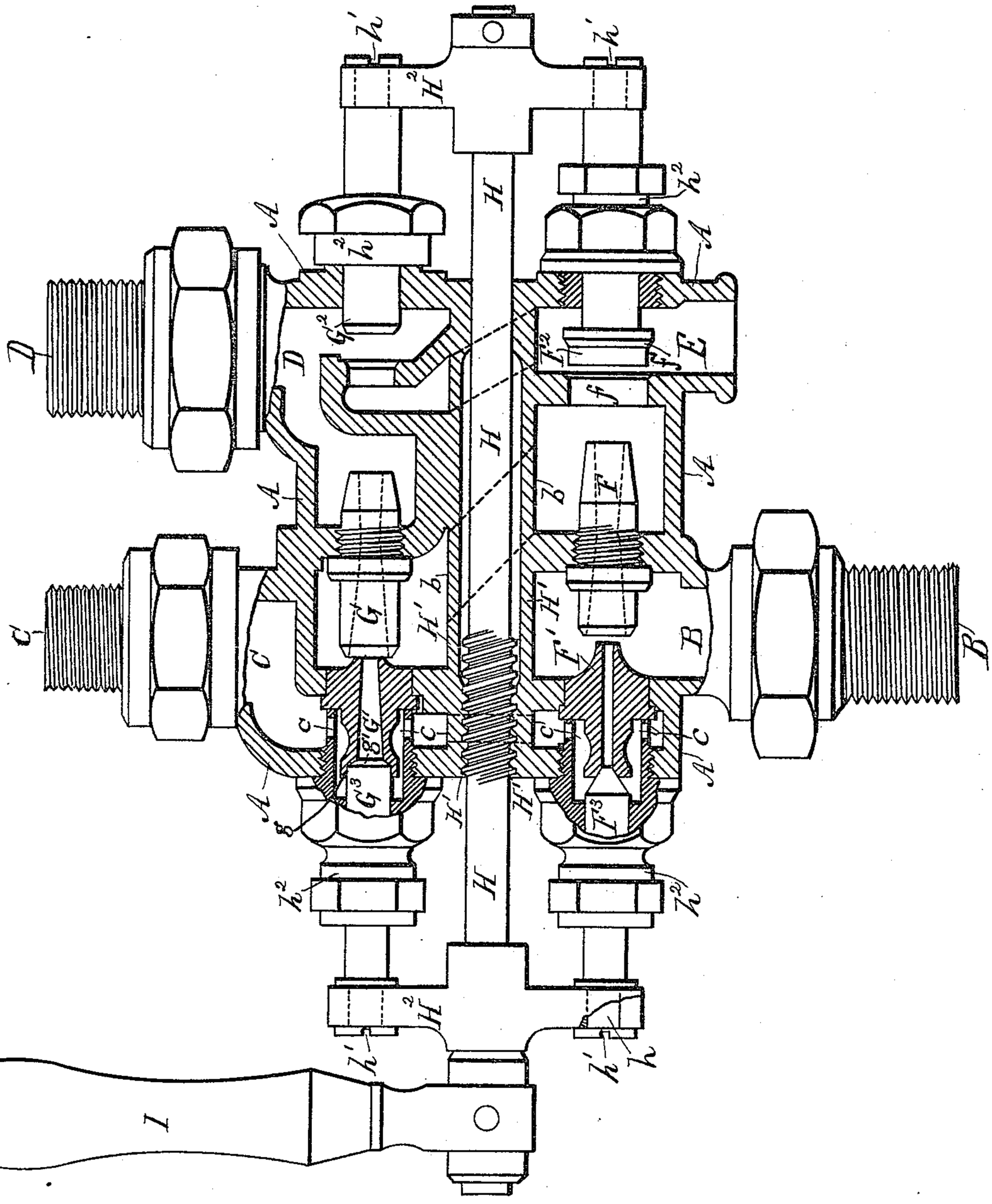
(Model.)

H. B. MURDOCK

STEAM INJECTOR.

No. 440,183. Patented Nov. 11, 1890.



WITNESSES

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HORACE B. MURDOCK, OF DETROIT, MICHIGAN, ASSIGNOR TO THE AMERICAN INJECTOR COMPANY, OF SAME PLACE.

STEAM-INJECTOR.

SPECIFICATION forming part of Letters Patent No. 440,183, dated November 11, 1890..

Application filed July 26, 1889. Serial No. 318,742. (Model.)

To all whom it may concern:

Be it known that I, HORACE B. MURDOCK, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Live-Steam Injectors; and I 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 pertains to make and use the same, reference being had to the accompanying drawing, which forms a part of this specification.

In the drawing the figure is a vertical section showing parts in elevation of an injector embodying my invention.

It is the purpose of my invention to produce an injector of the character known as "double" injectors, in which there are two force-tubes, said tubes being arranged in parallel order and operated by a single lever on a shaft parallel thereto.

The nature of my improvements will be understood by the following description.

A represents the injector-case.

B is the water-supply pipe; C, the steam-supply pipe; D, the conduit leading to the boiler; E, the overflow-conduit.

F is the first or primary force-tube, and G the other or secondary force-tube.

F′ and G′ are the respective steam-nozzles.

F^2 and G^2 are the corresponding overflow-valves.

F^3 and G^3 are valves governing the admission of steam to the respective nozzles.

The force-tube, steam-nozzle, steam-valves, and overflow-valve are arranged in line in each series, and the two series are arranged in parallel order, as shown. Parallel with the two series, as above, is a shaft H, tapped through a stationary support H′, and provided with cross-heads H^2, to which said steam-valves and overflow-valves are secured. Each said valve-stem is seated in an open yoke at the end of the cross-head, the stem being reduced, as shown at *h*, so as to be held firmly by the yoke against longitudinal displacement, and each is provided with a slot *h′* or other facilities for engagement with a tool, whereby it may be turned to grind its valve upon the valve-seat.

h^2 are stuffing-boxes through which the valves slide as they are moved toward or from their seats.

It will be observed that as the handle I is turned through the screw engagement H′ the shaft H with its valves is shifted longitudinally. The steam-valve F^3 is seated so as to open at once on turning the handle I. The conical end *g′* of the steam-valve G^3 is sleeved into its seat, as shown at *g*, so as to simultaneously leave its seat, but not to open a steam-passage until the handle is given a further turn. On the other hand, the conical end *f′* of the overflow-valve F^2 is sleeved into its seat, as shown at *f*, so as to cut off the overflow in advance of the overflow-valve G^2 and yet adapted to come to its final seat simultaneously with the valve G^2.

The operation of the device will now be understood. The steam-valves are closed down on their seats, both overflow-valves F^2 G^2 are open, and the handle is in the position, all as shown in the drawing. Now, when it is desired to start the injector, the handle is given a quarter-turn. This opens a steam-passage past the valve F^3, and the water is lifted and accelerated through the primary force-tube F, the overflow-valve F^2 being still open, thereby facilitating the flow. As soon as water overflows through the valve F^2 the handle is turned until it has completed a half-revolution. This results in closing the overflow-valve F^2 while the overflow-valve G^2 still remains open and the steam-valve G^3 closed. The result is that the water, finding no escape through F^2, is obliged to pass up through the passages *b* and through the secondary force-tube G, and finds relief through the overflow-valve G^2, which is yet open. Now the handle is brought around so as to complete three-quarters of the entire revolution. The result of this further movement is to open the steam-passage past the valve G^3, which serves to accelerate the water through the force-tube G, while some relief is still had at the overflow-valve G^2 not yet entirely closed. A further turn of the handle opens the steam-valve G^3 still wider, closes both the overflow-valves firmly on their conical seats, and the current is fully established into the boiler.

The passages *c* afford free access of steam at all times to the chambers back of the valves F^3 G^3.

Of course it is not absolutely essential that the rod or shaft H should pass through the body of the injector or between the two series of steam-valves, since the construction in this respect might be changed without departing from the spirit of my invention.

What I claim is—

1. An injector provided with two series of steam-valves, force-tubes, and overflow-valves, all said valves connected with a single actuating-shaft adapted to move them equally and simultaneously, substantially as described.

2. An injector consisting of the combination, with two series of steam-valves, force-tubes, and overflow-valves adapted to act successively on the feed-water, of an actuating-shaft to which all said valves are engaged and which operates them simultaneously, said valves and their valve-seats so adjusted with respect to each other that as the actuating-shaft is moved the primary steam-valve will open a steam-passage in advance of the secondary, and the primary overflow-valve will close its escape-passage in advance of the secondary, substantially as described.

3. In an injector, the combination, with two parallel series of steam-valves, force-tubes, and overflow-valves arranged to act successively on the column of feed-water, of a parallel actuating-shaft to which all said valves are engaged, the primary overflow-valve and the secondary steam-valve each having a close-fitting socket or sleeve in advance of its valve-seat, whereby as the valves are simultaneously moved a steam-passage is opened through the primary steam-valve in advance of the secondary steam-valve and the escape of water through the primary overflow-valve is cut off in advance of that through the secondary overflow-valve, substantially as described.

4. In an injector, the combination, with two parallel series of steam-valves, force-tubes, and overflow-valves, of an actuating-shaft parallel thereto, with which all said valves are engaged, said shaft tapped through a stationary support, and a handle for turning it in its said support, whereby said valves are actuated, substantially as described.

5. The combination, with the actuating-shaft, of the valve-stems engaged therewith by a shouldered engagement, whereby they are prevented from longitudinal displacement, and provided at their ends with facilities for engagement with a tool for rotating the same and grinding the valves on their seats, substantially as described.

6. In an injector, the combination, with the valves F^3 G^2, of the valves F^2 G^3 and the sleeves or sockets *f g* back of the latter valves, whereby they are permitted to move a distance from their seats before opening the passages past them, substantially as and for the purpose described.

In testimony whereof I sign this specification in the presence of two witnesses.

HORACE B. MURDOCK.

Witnesses:

W. H. CHAMBERLIN,

L. A. DOELTZ.