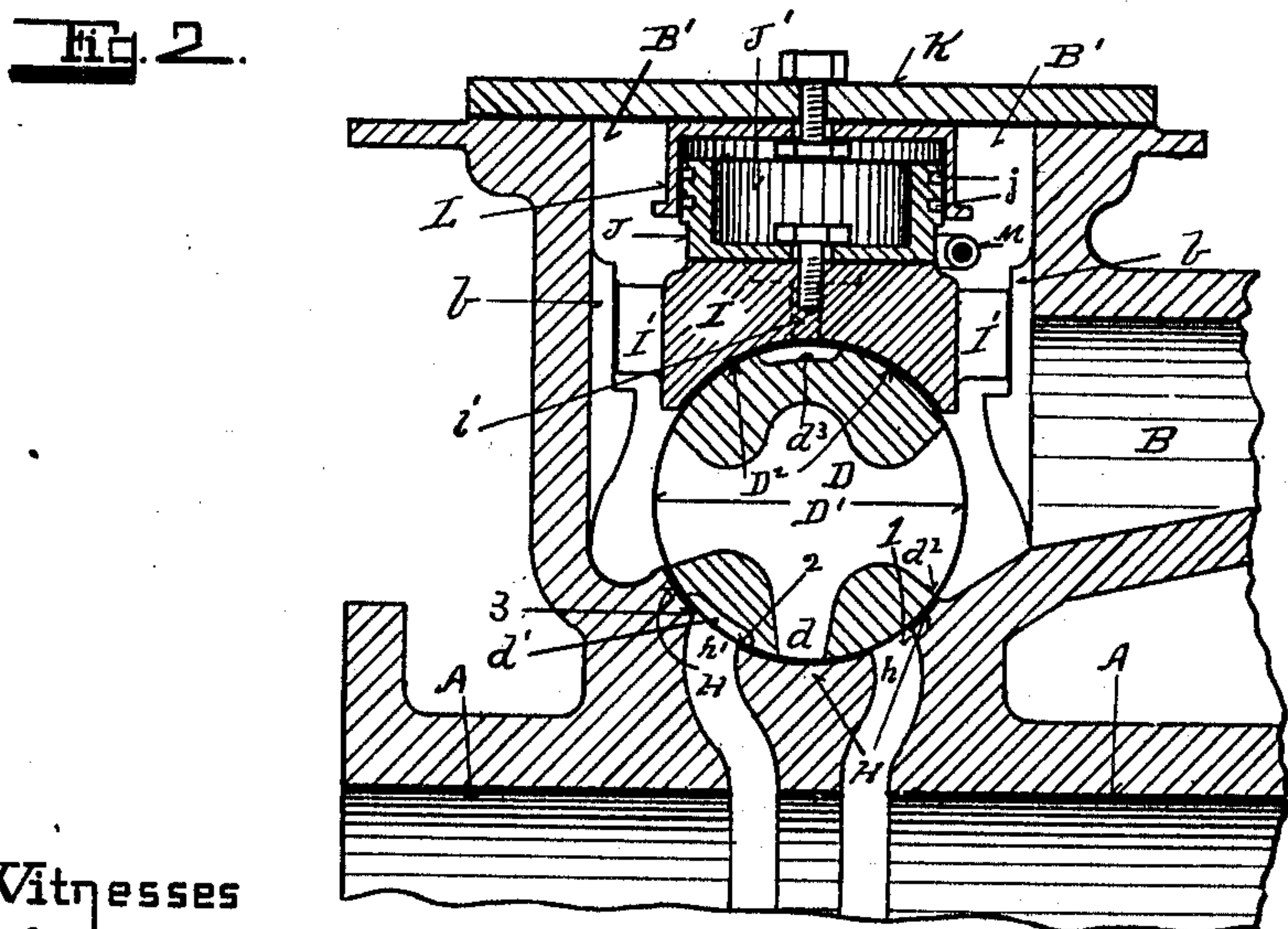
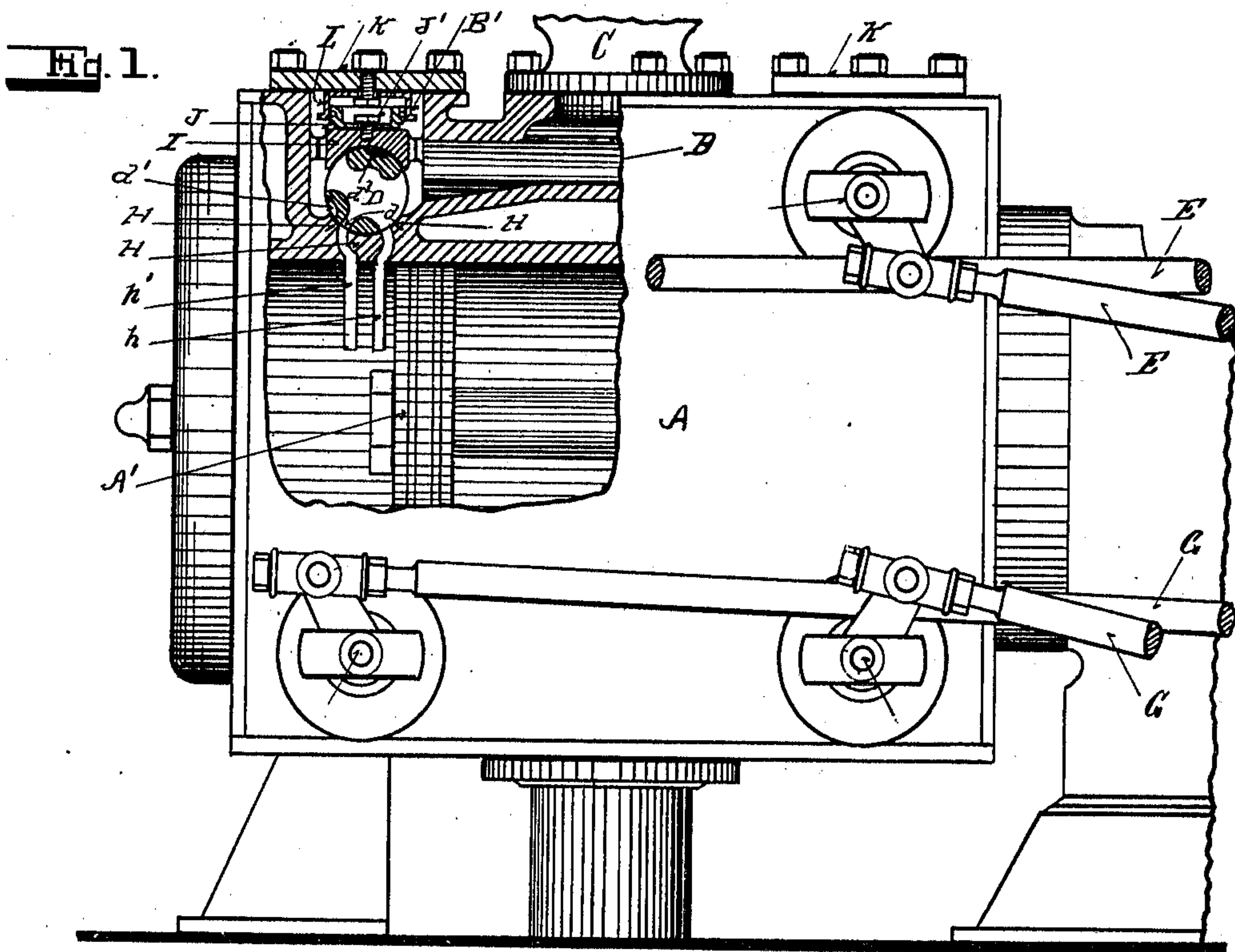


LE GRAND SKINNER.
ENGINE VALVE.
APPLICATION FILED JULY 13, 1910.

990,305.

Patented Apr. 25, 1911.

2 SHEETS—SHEET 1.



Witnesses

G. J. Maud
Florence Stockert.

Inventor.

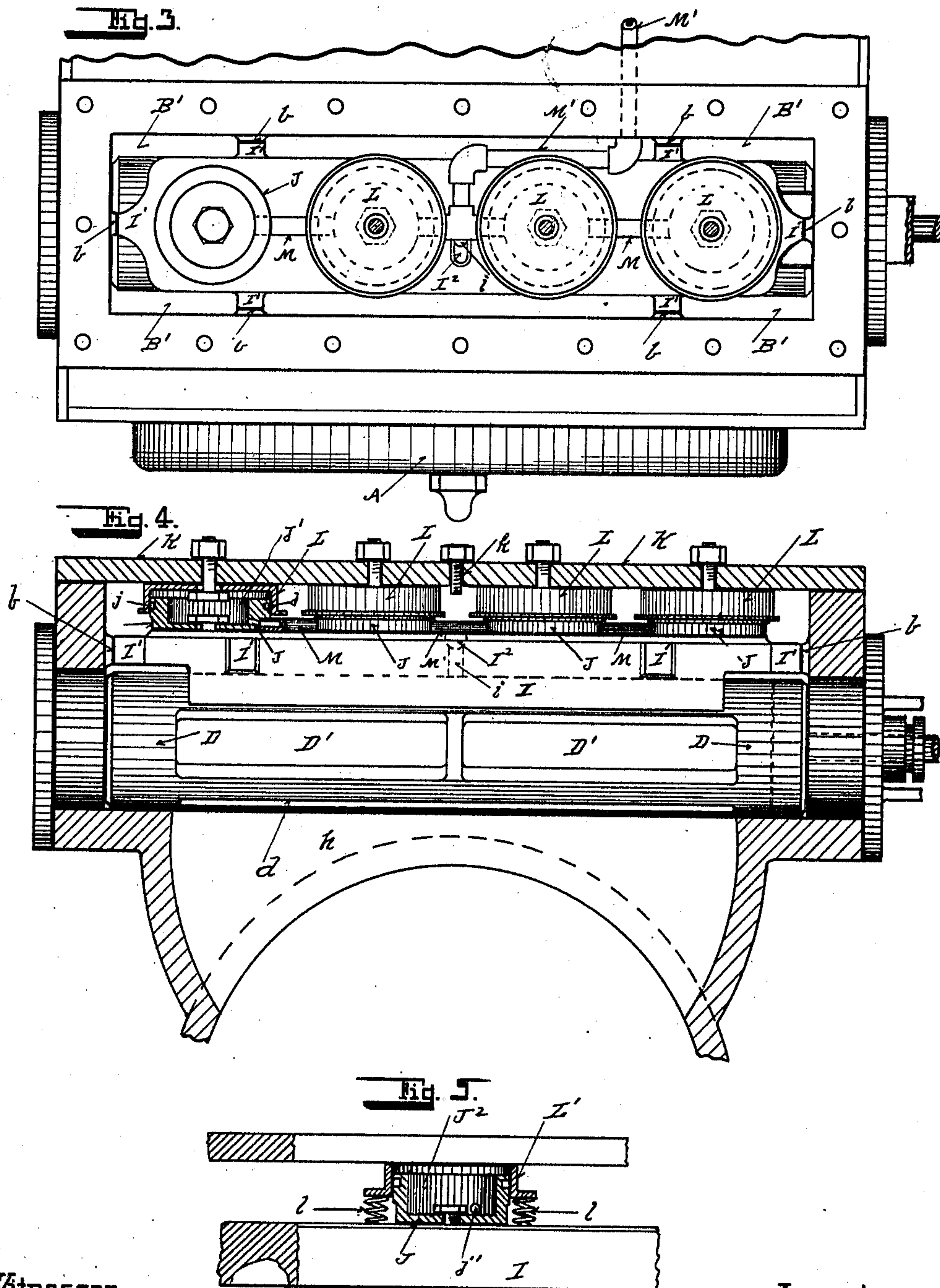
Le Grand Skinner
By J. L. & W. M. Sturgeon
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UNITED STATES PATENT OFFICE.

LE GRAND SKINNER, OF ERIE, PENNSYLVANIA.

ENGINE-VALVE.

990,305.

Specification of Letters Patent.

Patented Apr. 25, 1911.

Application filed July 13, 1910. Serial No. 571,766.

To all whom it may concern:

Be it known that I, LE GRAND SKINNER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Engine-Valves; and I do hereby 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 letters of reference marked thereon, forming part of this specification.

My invention relates to steam engine valves, and particularly to valves of the rotary type, and has for its object the combination with a rotary steam engine valve, of one or more cylindrical shells between the valve plate resting upon the valve and the steam chest cover in such a manner that the valve is largely relieved from the normal pressure of steam in the steam chest and the ordinary wear of the valve is compensated for, so that while the valve is at all times retained in proper contact with the valve-seat, yet it is free from undue pressure of the steam thereon.

I am aware of the fact that it is not new to apply rectangular balancing plates to rotary valves, and balancing shells or cylinders to slide valves, but I am not aware of any construction having been made in which cylindrical balancing shells have been combined and used with rotary valves prior to my invention thereof, as there are many difficulties to be overcome in the application of cylindrical balancing mechanism as heretofore used on slide valves to a rotary valve so as to produce the results above noted.

The features of my invention are hereinafter fully set forth and explained and illustrated in the accompanying drawings, in which:

Figure 1 shows in elevation a steam engine cylinder embodying my invention with parts thereof broken away. Fig. 2 shows an enlarged section of a portion of a steam engine cylinder with my improved valve mechanism therein. Fig. 3 is a top or plan view of my improved valve mechanism with the valve-chest cover removed. Fig. 4 is a transverse section of a steam engine cylinder through one of the valve chambers showing the valve mechanism partly in elevation and partly in section. Fig. 5, shows a modified

construction of the balancing mechanism of my improved valve.

In the drawings illustrating my invention, A, is an engine cylinder, A', the piston of the engine, B, the steam chest, and C, a steam inlet pipe on the top thereof. At each end of the steam-chest, B, in valve-chambers, B', there is a steam inlet valve, D, operated by means of valve-rods, E, E, in the usual manner, and at the bottom of the ends of the cylinder, A, there are the usual exhaust valves, F, F, operated by valve-rods, G, G, in the usual manner.

The inlet valves, D, are mounted on valve-seats, H, preferably provided with ports, *h*, *h'*, and the valves, D, are provided with central chambers, D', extending transversely therethrough into which the steam passes from the valve chambers, B'. In the lower surface of the valve, D, I make a direct port, *d*, and also a recess, *d'*, which operate when the valve is rotated, to open it, first to admit steam to both ports, *h*, and *h'*, through triple port openings, 1, 2 and 3, in the valve, D, and when the valve, D, is further rotated toward and to its full open point, the port, *d*, coincides with the valve-seat port, *h'*, and the port, *d*², of the valve coincides with the valve-seat port, *h*.

In the upper part, D², of the valve, D, there is a longitudinal recess, *d*³, which communicates with the valve chamber, B', and resting on the top, D², of the valve, D, there is a valve-plate, I, the under face of which is concaved to form a bearing for the upper half, D², of the valve, and through this plate there is a passage, *i*, communicating with the recess, *d*³, in the upper part of the valve, D. This plate I, is provided with lugs, I', at its ends and at intervals along its sides, which contact with lugs, *b*, at the ends and sides of the valve chamber, B', and moves freely up and down therein.

On the top of the valve-plate, I, there is adjustably secured one or more cylindrical shells, J, closed at the bottom, and preferably adjustably secured to the inside of the valve-chamber cover, K, there are like cylindrical shells, L, closed at their upper ends within which the shells, J, telescope, so as to form a cylindrical chamber, J', between said shells, and to make a steam-tight joint between said shells I provide packing rings, *j*, in the periphery of the shell, J. From the chamber, J', I provide a passage, *j'*, connected by pipe connections M, M', with the

exhaust of the engine or with the atmosphere. In the drawings, Figs. 3 and 4, I have shown four pairs of shells, J, and L, secured to the valve-plate, I, and valve-chamber cover, K, thereby producing four chambers, J', which I have shown connected by pipes, M, with a branch pipe, M', leading therefrom, so that the balancing action of all of the chambers, J', is uniformly exerted on the back of the valve-plate, I. These balancing chambers, J', cut off the live steam from the greater part of the area of the valve-plate, I, and a further portion of the pressure thereon is counterbalanced by the steam in the recess d^3 between the top of the valve, D, and the under side of the plate, I. The remainder of the plate, I, subject to the steam pressure in the valve-chamber, B', is sufficient to retain the valve plate I, in contact with the top, D^2 of the valve, D, and the free vertical movement of the valve-plate, I, also operates to take up any wear of the valve, D, on the valve-seat, so that the parts are always in operative condition.

In Fig. 5, I have shown a modified construction of the mechanism forming chambers, J'. In this construction the upper shell, L', is open at its top, and between the upper edge of its periphery and the inside face of the valve-chamber cover, K, I make a steam-tight joint in the usual manner, and to keep the shell, L', in close contact with the valve-chamber cover when there is no steam in the valve-chamber, B', I provide springs, l , between the lower edge of the shell, L', and the top of the valve-plate, I. Otherwise the structure shown in Fig. 5, is constructed the same, and produces like results as that hereinbefore described.

For lubricating the valve mechanism hereinbefore described, I connect the stem of a lubricator through an opening, h , in the valve-chamber cover, K, whence the oil drops down into a recess, I^2 , in the top of the valve-plate, I, and thence passes down through a hole, i , leading from the bottom of the recess, I^2 through the valve-plate, I, where it communicates with the longitudinal recess, d^3 , in the top, D^2 of the valve, D, which recess operates to distribute the oil both ways along the top of the valve between it and the under surface of the valve plate, I, thereby lubricating the valve mechanism, after which the oil passes through the ports, h , and h' , into the cylinder, A.

In operation the mechanism hereinbefore described not only reduces the pressure of the steam in the valve-chamber, B', upon the valve-plate, I, and therefore of the valve, D, upon the valve-seat, H, but the recess d^3 in the top, D^2 , of the valve, D, also operates to reduce the pressure of the valve-plate, I, upon the valve, D, and at the same time diminishes the friction between the valve-plate I, and the top of the valve, D.

I have thus shown and described a convenient form of mechanism for approximately balancing a rotary steam engine valve. It is obvious however, that many features thereof may be considerably modified without departing from the spirit of my invention.

Therefore what I claim as new and desire to secure by Letters-Patent is:

1. The combination in a steam engine of a concave valve seat in a valve chamber, having steam ports therein, a rotary valve having steam ports therein operating on said valve-seat, a valve-plate concaved on its under surface resting upon the top of the valve, a cylindrical shell secured to the top of the valve-plate, a cylindrical shell contacting with the under surface of the valve chamber cover, and telescopically connecting with the cylindrical shell on the valve-plate so as to form an inclosed chamber between said shells, and means connecting said chamber with the engine exhaust, substantially as set forth.

2. The combination of a steam engine cylinder having a valve-chamber and steam-chest communicating therewith, a concave valve-seat in said valve-chamber having steam-ports therein, a hollow rotary valve having ports therein and a recess in the upper part thereof operating on said valve-seat, a valve-plate having its upper surface concaved resting upon said rotary valve, a cylindrical shell secured to the top of said valve-plate, a cylindrical shell contacting with the under surface of the valve-chamber cover, and telescopically connecting with the shell on the valve-plate so as to form an inclosed chamber, means for connecting the valve-chamber with the recess in the upper part of the valve, and means connecting said inclosed chamber with the engine exhaust, substantially as set forth.

3. The combination in a steam engine, of a concave valve-seat in a valve-chamber having steam-ports therein, a rotary valve having steam-ports therein operating on said valve-seat, a valve-plate concaved on its under surface resting upon the top of said rotary valve, a series of cylindrical shells secured to the top of said valve-plate, a series of like shells contacting with the under surface of the valve-chamber cover and telescopically connecting with the shells on the valve plate so as to form inclosed chambers between said shells, pipe connections between said chambers and a pipe connection therefrom to the engine exhaust, substantially as set forth.

4. The combination in a steam-engine, of a concave valve-seat having duplicate steam ports therein, a hollow rotary valve having a direct steam port and a longitudinal groove in the bottom thereof operating as a steam-port as the valve is rotated to open it

whereby triple steam inlets to the valve-seat ports are provided, a valve-plate concaved on its under surface resting upon the top of the valve, hollow shells secured to the top of the valve-plate, like hollow shells adjustably secured to the under surface of the valve-chamber cover and telescopically connecting with the shells on the valve-plate so as to form inclosed chambers between said shells, pipe connections between said chambers, and a pipe connection therefrom to the engine exhaust, substantially as set forth.

5. The combination in a steam engine, of a concave valve-seat in a valve-chamber having steam ports therein, a hollow rotary valve operating on said valve-seat having steam ports therein and also having a longitudinal recess in the top thereof, a valve-plate concaved on its under surface resting upon the top of said rotary valve, and having an oil opening therein communicating

with the recess in the top of the valve, hollow shells adjustably secured to the top of said valve-plate, like hollow shells adjustably secured to the under surface of the valve-chamber cover and telescopically connected with the shells on the valve-plate so as to form inclosed chambers between said shells, piston rings between said shells to make the telescopic joints between them substantially steam-tight, pipe connections between the chambers formed by said shells, and a pipe connection communicating therefrom to the engine exhaust, substantially as set forth.

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

LE GRAND SKINNER.

Witnesses:

F. M. STURGEON,
P. V. GIFFORD.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
