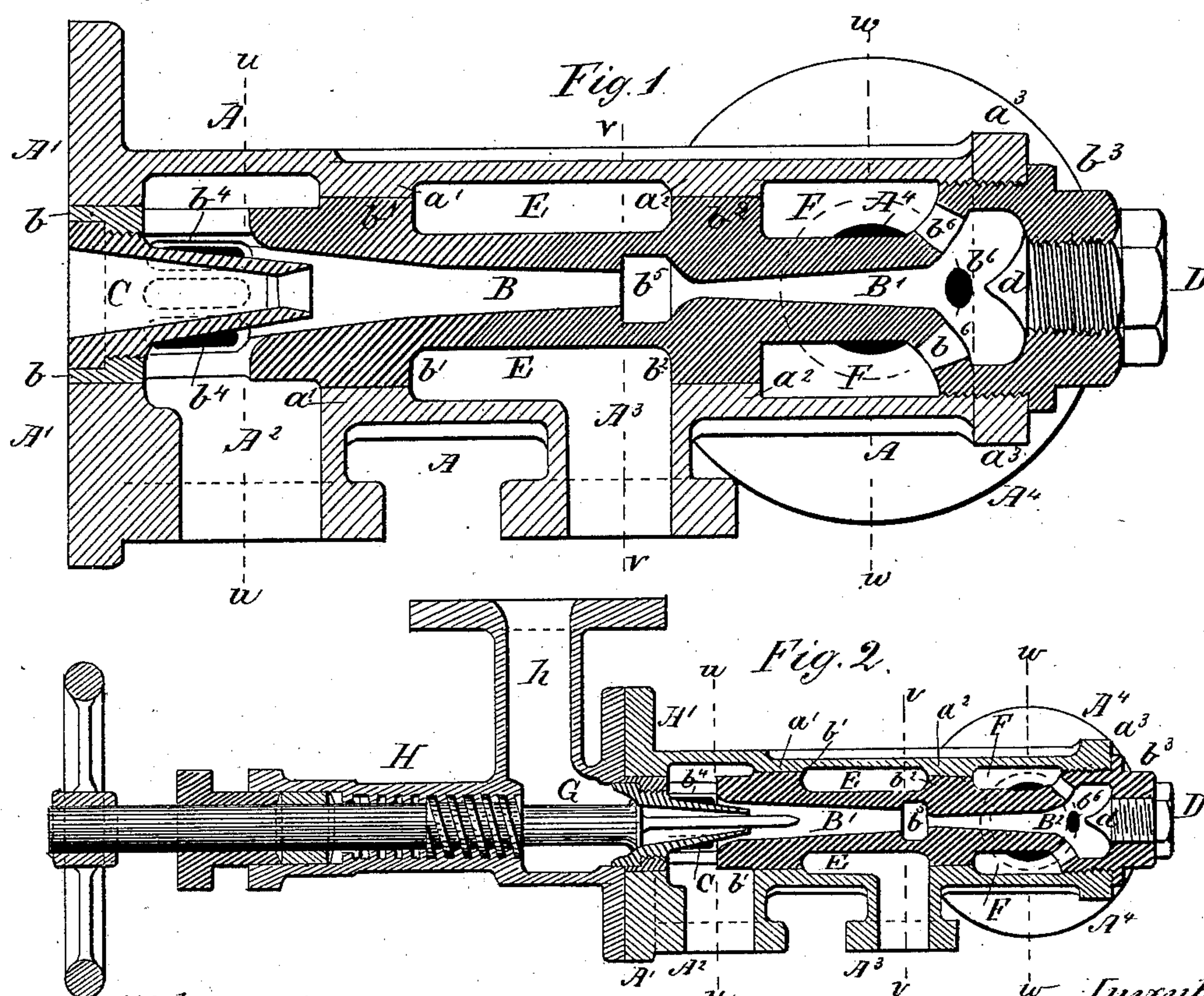
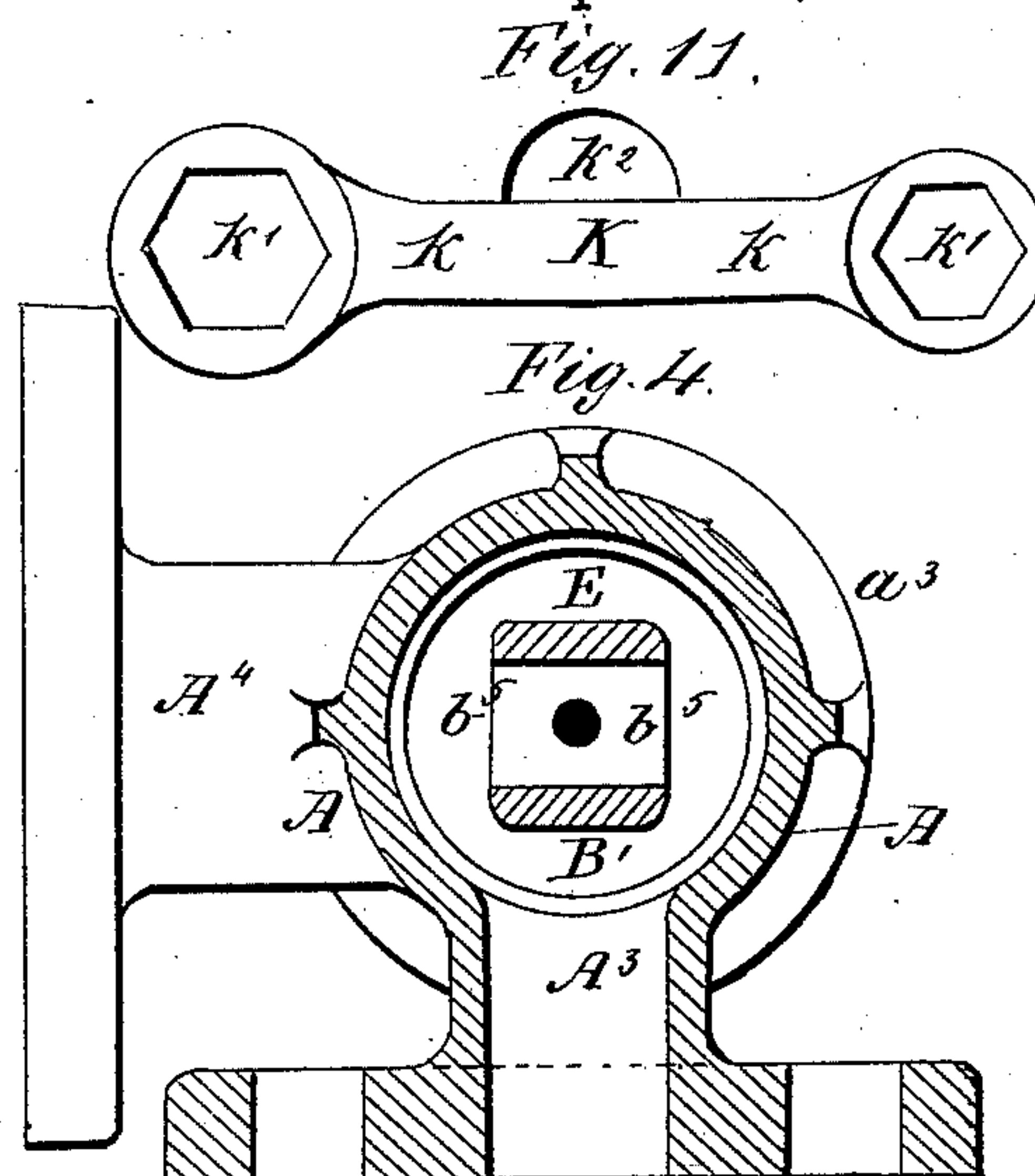


2 Sheets—Sheet 1.

No. 285,171.

Patented Sept. 18, 1883.



Witnesses
William C. Boulter.
J. W. Smith.

v w Inventors
 Edward G. Sheward
 James Gresham
 for Henry Orth

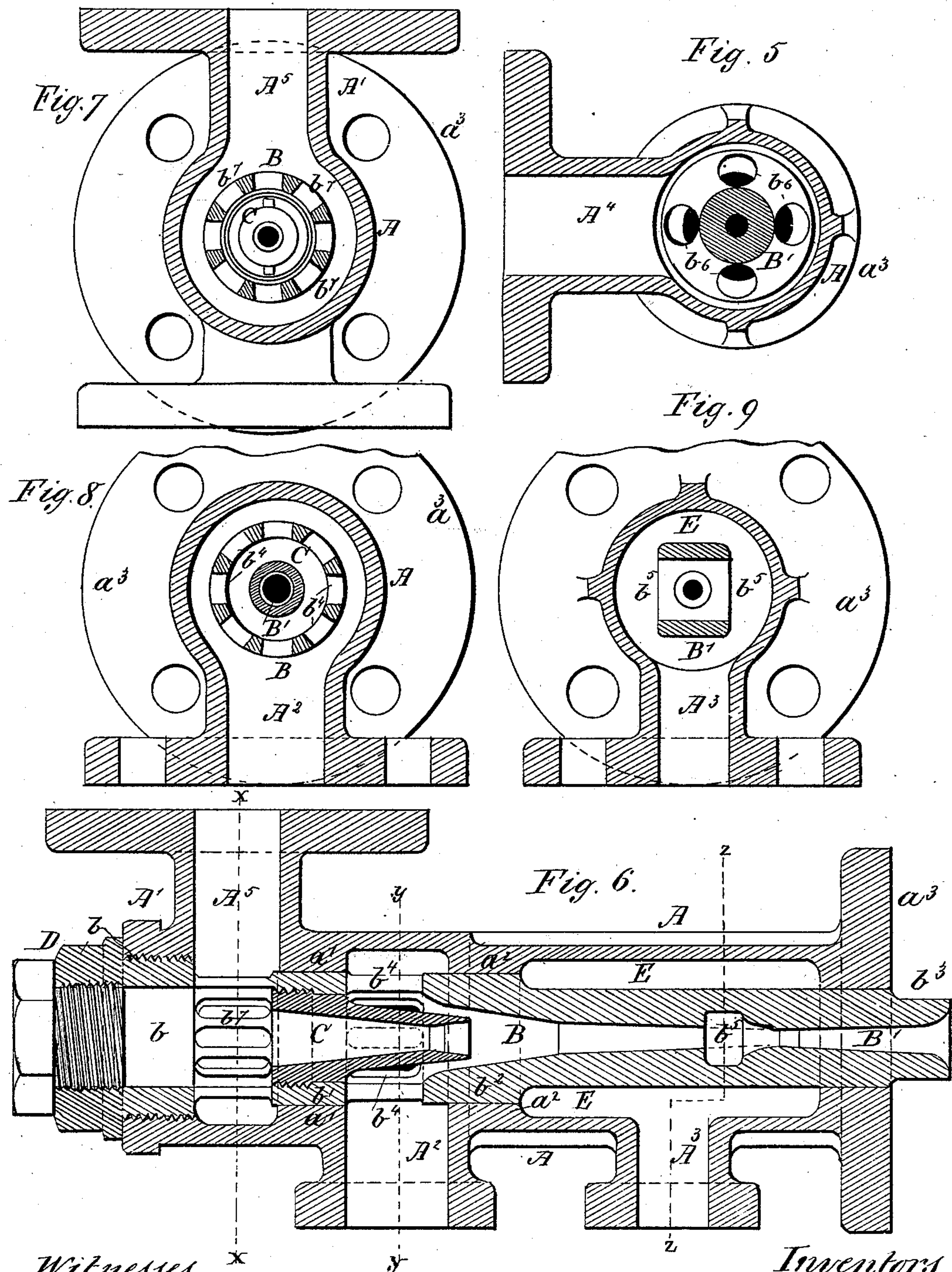
(Model.)

2 Sheets—Sheet 2.

E. G. SHEWARD & J. GRESHAM.
INJECTOR.

No. 285,171.

Patented Sept. 18, 1883.



Witnesses
William D. Foulter
W. H. Knott

Inventors
Edward G. Sheward
James Gresham
per Henry Cotta
their atty

UNITED STATES PATENT OFFICE.

EDWARD G. SHEWARD, OF RICHMOND, COUNTY OF SURREY, AND JAMES GRESHAM, OF SALFORD, COUNTY OF LANCASTER, ENGLAND.

INJECTOR.

SPECIFICATION forming part of Letters Patent No. 285,171, dated September 18, 1883.

Application filed May 9, 1883. (Model.) Patented in England November 26, 1877, No. 4,436; in France May 29, 1878, No. 124,802, and in Belgium May 31, 1878, No. 45,311.

To all whom it may concern:

Be it known that we, EDWARD G. SHEWARD and JAMES GRESHAM, citizens of Great Britain, residing at Richmond, in the county of Surrey, and at Salford, in the county of Lancaster, England, respectively, have invented certain new and useful Improvements in Injectors; and we 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 letters or figures of reference marked thereon, which form a part of this specification.

Our invention relates to improvements in the construction of injectors or ejectors, and has for its object to provide means whereby the interior parts thereof may be readily examined without disconnecting the inclosing-case from the pipes that convey the fluids to and from the same, and whereby said internal parts may be bodily removed from the casing for the removal of accidental obstructions, or other purposes which may necessitate such removal.

To these ends the invention consists in the construction of the internal parts of the injector and their combination with their inclosing-case, substantially as hereinafter fully described, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal section, showing our improvements as applied to an injector or ejector without a central spindle for regulating the steam. Fig. 2 is a like view, showing the same as applied to an injector with a central spindle. Figs. 3, 4, and 5 are transverse sections taken on lines *u u*, *v v*, and *w w*, respectively, of Figs. 1 and 2. Fig. 6 is a longitudinal section of an injector-ejector, showing a modified construction in which the internal parts are arranged for removal from the end of the casing opposite to that of Figs. 1 and 2. Figs. 7, 8, and 9 are transverse sections taken on lines *x x*, *y y*, and *z z*, respectively, of Fig. 6. Figs. 10 and 11 show in elevation and by an edge view a combined key and screw-driver suitable for taking the injector-ejector to pieces.

Like letters indicate like parts wherever such may occur.

A is the outer casing of the injector-ejector, the flanged end A' of which constitutes the steam-inlet and is secured to the steam-supply pipe. Said casing has a water branch, A², an overflow branch, A³, and a branch, A⁴, for the discharge of the combined steam and fluid. When the apparatus is used as an ejector, we prefer to admit steam by branch A² and air by branch A', and, if desired, the overflow branch A³ may be dispensed with.

In order to facilitate the examination of the internal passage and parts, and to adapt the latter to be bodily removed from the casing A without disconnecting the same from the feed, discharge, and overflow pipes, we form the combining and discharging cones B' B² in one piece, the smaller end *b* of which is screw-threaded for the reception of the steam nozzle or cone C. The cone-piece B' B² has two annular bosses, *b'* *b*², both of greater diameter than the end *b*, that carries the steam-nozzle C, while the boss *b*² is of slightly greater diameter than the boss *b'*. These bosses fit snugly into seats or bearings formed by annular flanges or collars *a'* *a*² on the inner periphery of the casing A, and said bosses and seats may be cylindrical or conical. We prefer to make them cylindrical, as this construction involves considerably less labor, and equally as tight a joint may be obtained. The end *b*³ of the cone B' B² is of slightly greater diameter than the boss *b*², and is screw-threaded exteriorly and interiorly to adapt it to be screwed into the outer end, *a*³, of the casing A, and to receive a screw-plug, D, as shown in Figs. 1 and 2, that serves to close the outer end of said cone-piece B' B², and when removed to afford access to the discharging and combining cones for examination and removal of obstructions. The water enters at A² and passes around the nozzle C into the combining-cone through longitudinal slots or ports *b*⁴, Figs. 1, 2, 3, 6, and 7, formed in the periphery of the cone-piece B' B². The overflow passes through openings or lateral ports *b*⁵, Figs. 1, 2, 4, 6, and 9, formed at the point of intersection of the combining and discharging cones, into a chamber, E, formed by the combining-cone B', the bosses *b'* *b*², the casing A, and the seats *a'* *a*², and from said chamber E the

overflow passes into and out of branch A^3 . The combined steam and fluid pass through ports b^6 , Figs. 1, 2, and 5, into chamber F, formed by the outer casing, A, the boss b^2 , and the outer threaded portion, b^3 , of the cone-piece $B' B^2$, and out through branch A^4 . To better deflect the jet of combined steam and fluid laterally as it issues from the discharge end of the combining-cone and direct the same toward the ports b^6 , we form the screw-plug D with a cone-point, d , Figs. 1 and 2. When the injector-ejector is employed without a central regulating-spindle, the end A' is connected with the steam-pipe; and when a spindle, G, Fig. 2, is employed, then it is connected to a spindle-casing, H, provided with a steam branch, h , as plainly shown in said Fig. 2. Otherwise the construction is the same as that hereinabove described.

In view of the fact that neither the discharging nor combining cones nor the steam-nozzle is individually secured by screw-threads or otherwise to the inclosing-casing, and in view of the further fact that these parts form practically one piece, diminishing step by step from one end of the casing to the other, it is evident that by unscrewing the cone-piece $B' B^2$ from the end a^3 of said casing all the internal parts may be removed.

As the bosses formed on the said internal parts diminish in diameter and are fitted in corresponding seats formed on the casing, they will make tight joints when screwed into position, as will be readily understood.

Under some circumstances it may be found desirable to so construct the cone-piece $B' B^2$ as to adapt it for removal from the end A' opposite to that a^3 of the casing A. Such a construction we have shown in Figs. 6, 7, 8, and 9. In this construction the part comprising the combining and discharging cones $B' B^2$ and containing the steam nozzle or cone C is made to diminish step by step from the end A' to that a^3 of the casing, and the discharging-cone may be made to project beyond said end a^3 , as shown, to be directly connected with or introduced into the discharge branch, or the structure into which the fluid is to be injected, or caused to eject into the atmosphere. The end b of the cone-piece $B' B^2$ is here extended to receive the screw-plug D, and is screwed into the correspondingly-extended end A' of casing A, which extension has a steam branch, A^5 , the steam passing through longitudinal slots or ports b^7 , (similar to those b^4 ,) formed in the cone-piece, and thence into the steam-cone,

this modification in the construction of the parts being necessary to suit the change of direction of the withdrawal of the cone-piece, which is the reverse of that hereinabove described, the end b being here closed by the screw-plug D. When used as an ejector, the air and steam may be admitted through branches A^5 and A^2 , respectively, the former taking the place of the end A' , as hereinabove set forth.

The construction as well as the operation of the internal parts are the same as those described in reference to Figs. 1 and 2, except that said parts are adapted for bodily withdrawal from the casing in a reverse direction, as stated.

In Figs. 10 and 11 we have shown a convenient key, K, for taking the injector to pieces, the stem or shank k of which is provided at each end with nut-keys k' , of different diameters, and centrally with a screw-driver, k^2 , for the removal of the steam-cone.

Having thus described our invention, what we claim as new is—

1. In an injector, the combination, with the inclosing-casing, of combining and discharging cones made of one piece, and arranged to form within the casing a central passage open at both ends for the reception of the steam-cone and a screw-plug, said steam, combining, and discharging cones being adapted to be bodily removed from said casing without disconnecting the latter from its steam and water connections, as described, for the purposes specified.

2. In an injector, the combination, with the inclosing-casing, of combining and discharging cones made in one piece, and arranged to form a central passage open at both ends, and extending from one end to and beyond the opposite end of said casing, a steam-cone connected to and adapted for removal with said combining and discharging cones from one end of the casing, and a screw-plug for closing the central passage at that end of said casing, substantially as described, for the purposes specified.

In testimony whereof we affix our signatures in presence of two witnesses.

EDWARD G. SHEWARD.
JAMES GRESHAM.

Witnesses:

ALFRED S. SAONÉ,
OSMUND GIBSON,

Both of 60 Queen Victoria Street, London, E. C.