No. 724,641. PATENTED APR. 7, 1903.

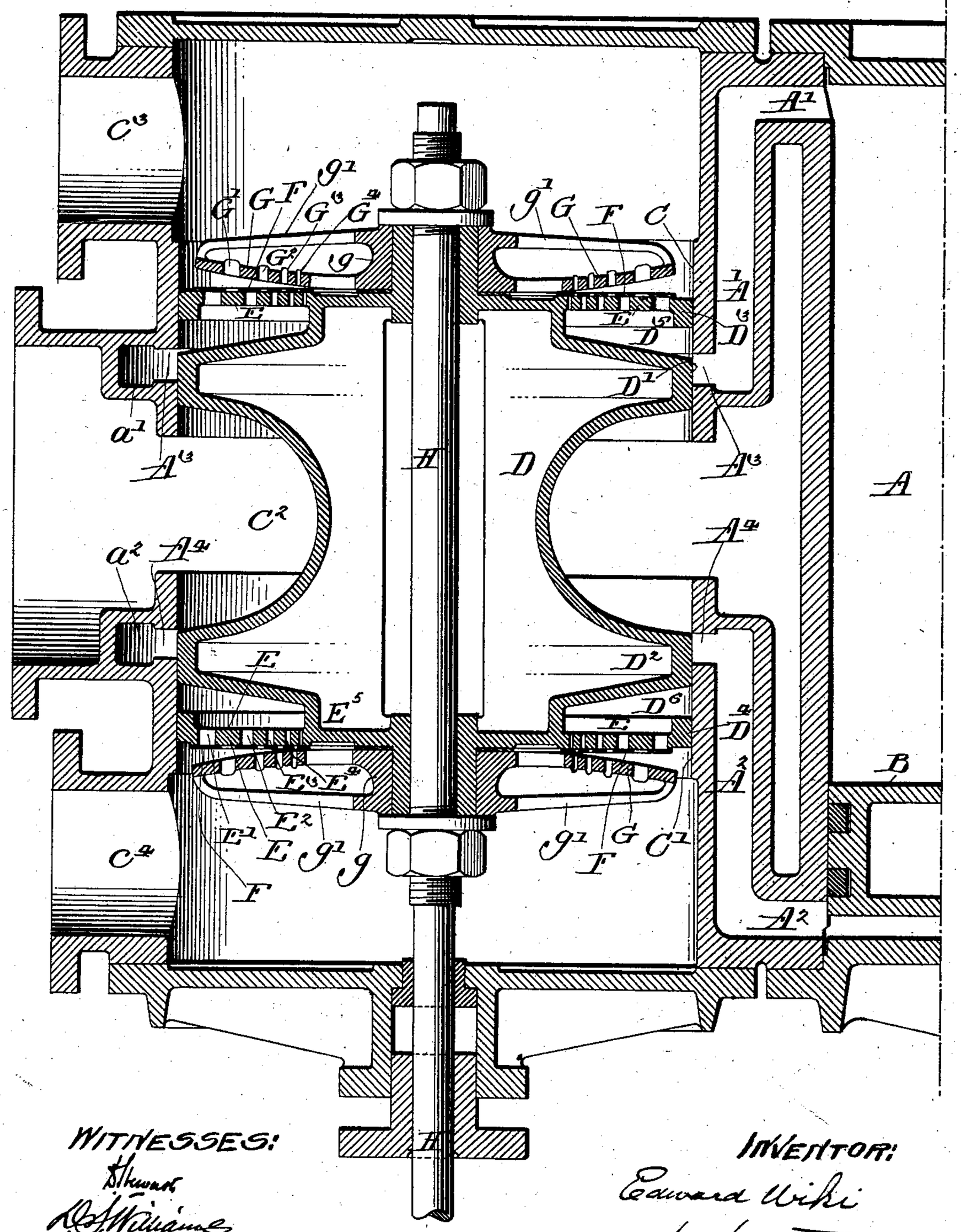
E. WIKI.

BLOWING ENGINE OR COMPRESSOR.

APPLICATION FILED OCT. 23, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

H. Stewart

D. S. Williamson

INVENTOR:

Edward Wiki

by his atty.

Francis T. Chamberlain

No. 724,641. PATENTED APR. 7, 1903.

E. WIKI.

BLOWING ENGINE OR COMPRESSOR.

APPLICATION FILED OCT. 23, 1901.

NO MODEL. 4 SHEETS—SHEET 2.

FIG. 2.

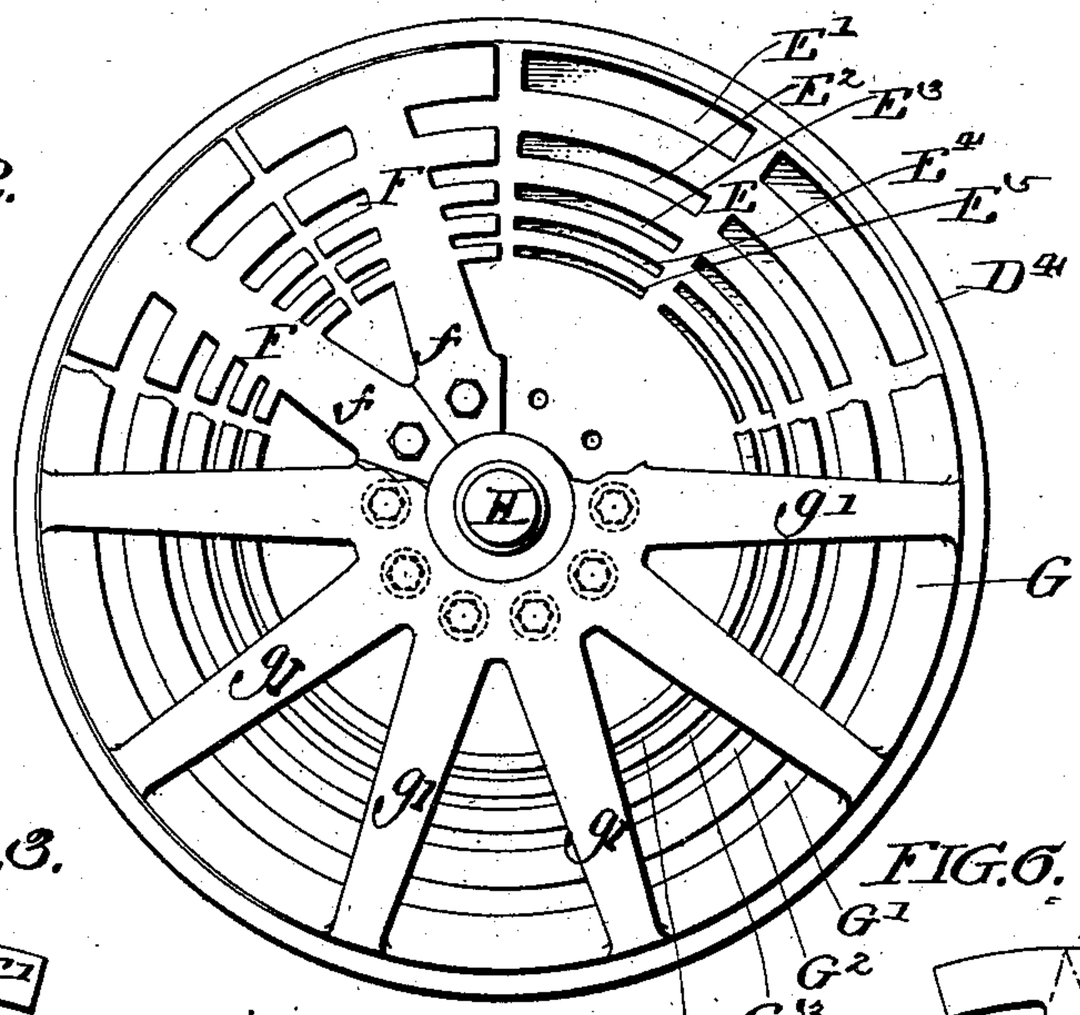


FIG. 4.

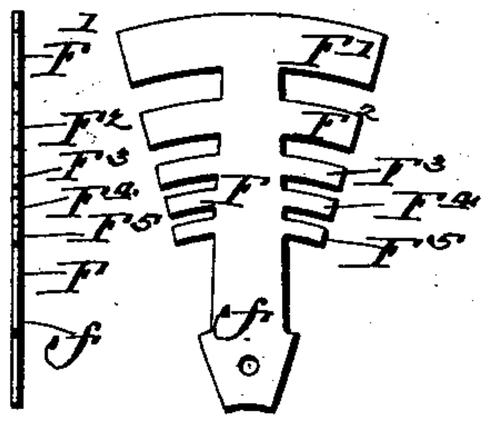


FIG. 3.

FIG. 6.

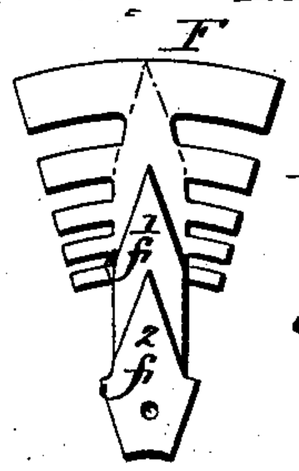


FIG. 7.

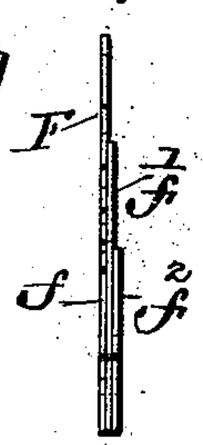
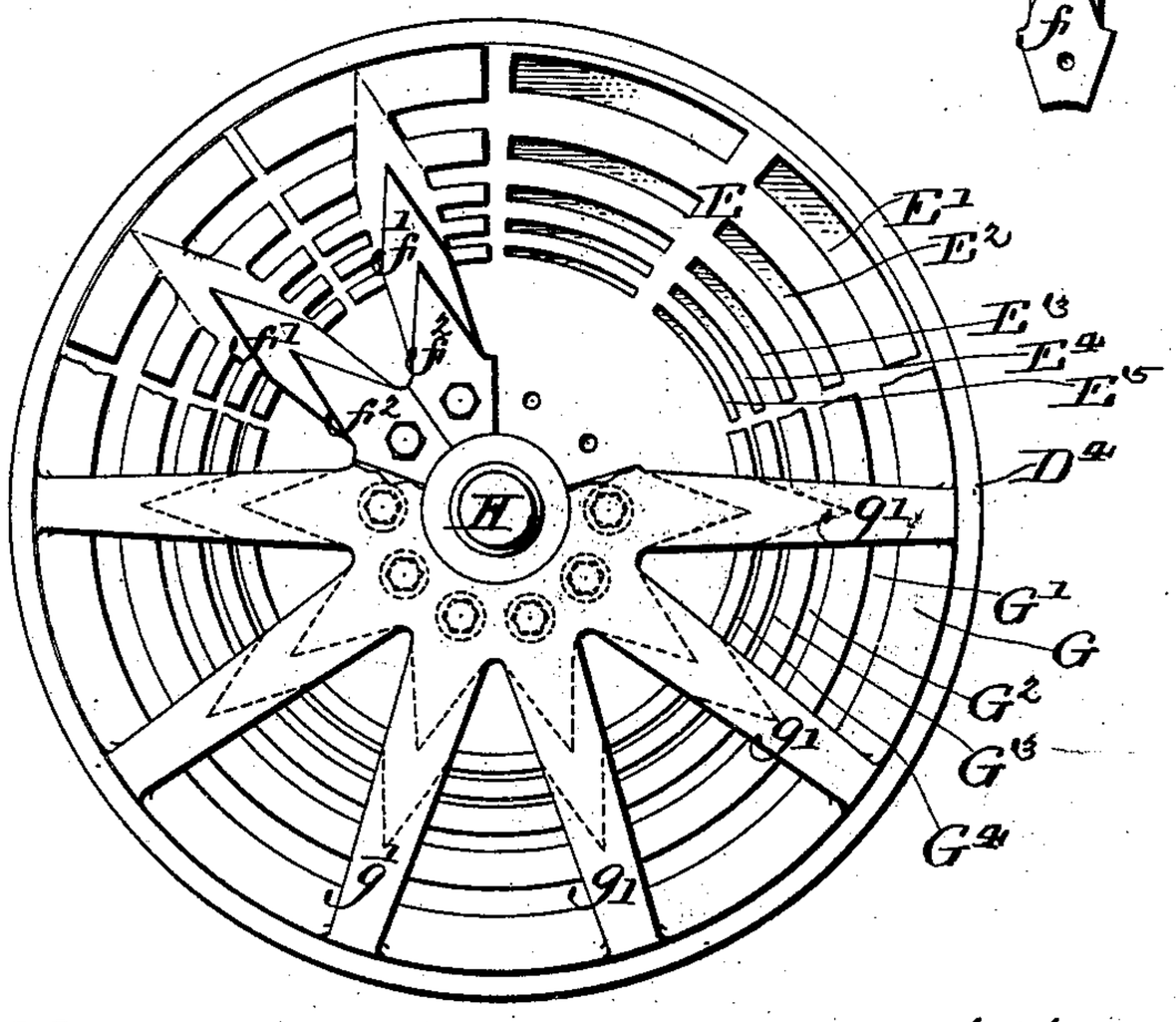


FIG. 5.



WITNESSES:

H. Howard

D. S. Williams

INVENTOR:

Edward Wiki

by his atty.

Francis J. Chambers

No. 724,641. PATENTED APR. 7, 1903.

E. WIKI.

BLOWING ENGINE OR COMPRESSOR.

APPLICATION FILED OCT. 23, 1901.

NO MODEL. 4 SHEETS—SHEET 3.

FIG. 8.

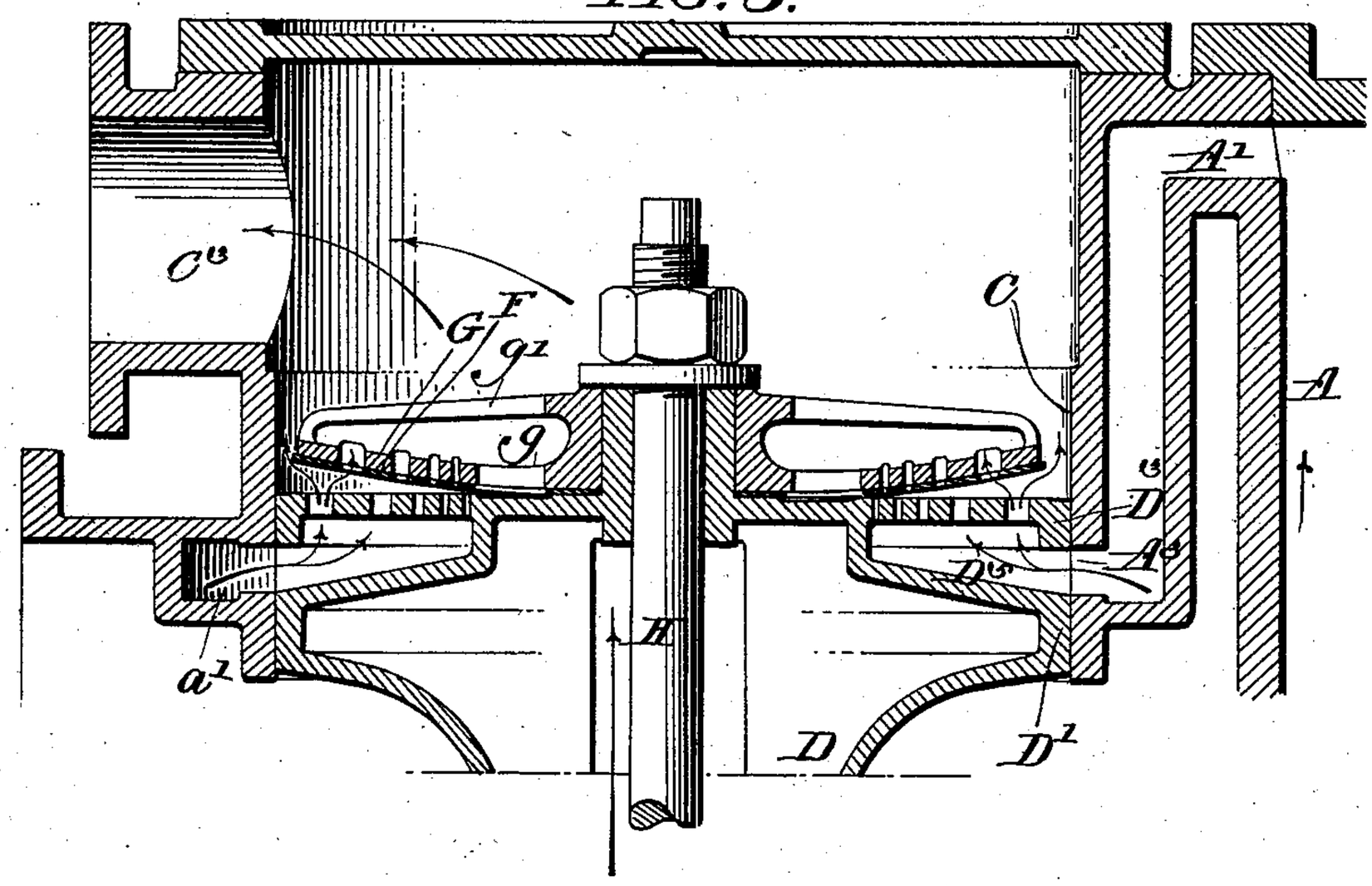
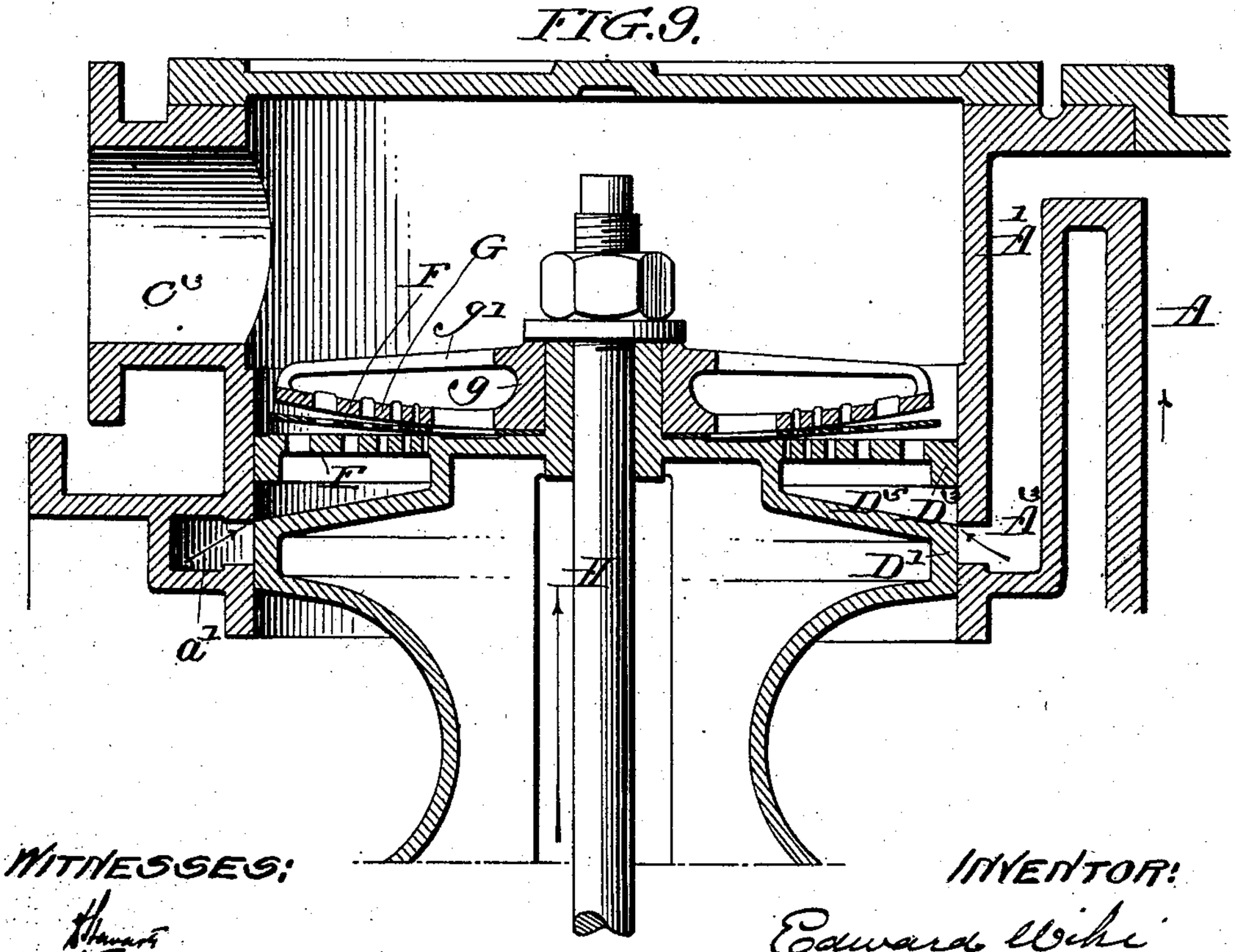


FIG. 9.



WITNESSES:

H. Howard

A. S. Williams

INVENTOR:

Edward Wiki

by his atty

Francis J. Chamberlin

No. 724,641. PATENTED APR. 7, 1903.

E. WIKI.

BLOWING ENGINE OR COMPRESSOR.

APPLICATION FILED OCT. 23, 1901.

NO MODEL. 4 SHEETS—SHEET 4

FIG. 10.

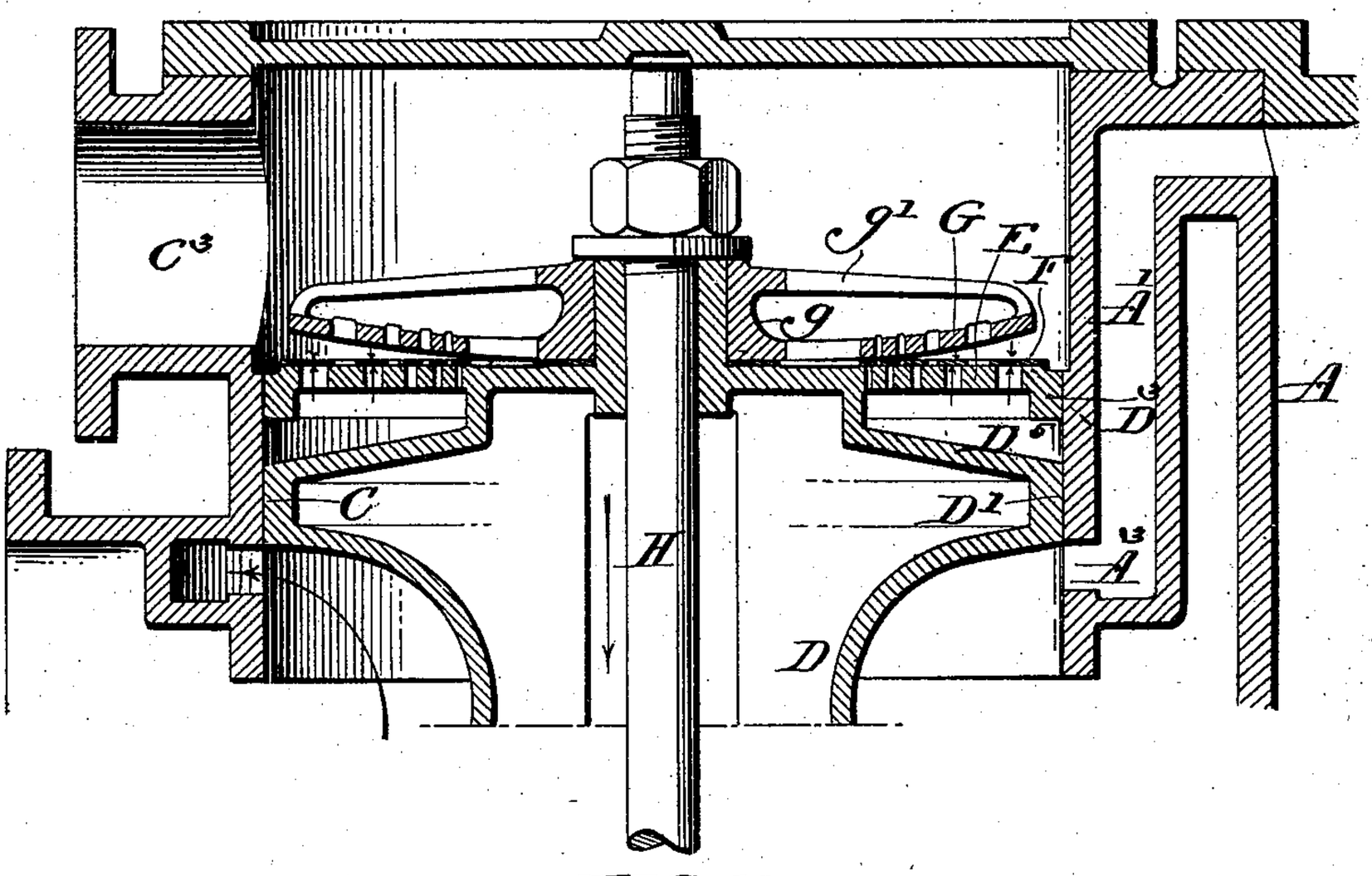
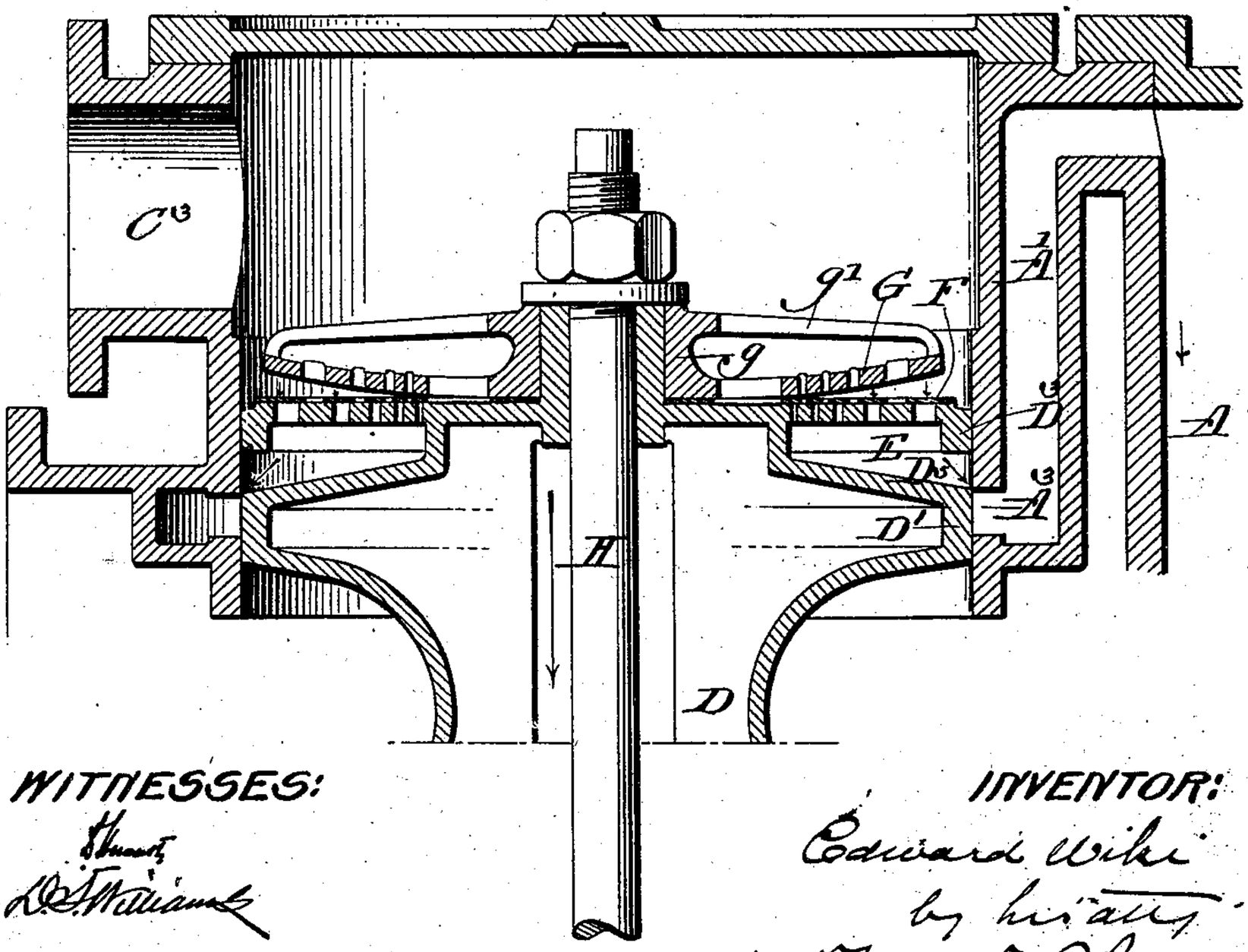


FIG. 11.



WITNESSES:

H. Hunnett

D. T. Williams

INVENTOR:

Edward Wiki

by his atty.

Francis D. Saunders

UNITED STATES PATENT OFFICE.

EDWARD WIKI, OF BASLE, SWITZERLAND.

BLOWING-ENGINE OR COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 724,641, dated April 7, 1903.

Application filed October 23, 1901. Serial No. 79,616. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WIKI, a citizen of the Republic of Switzerland, residing at Basle, in the canton of Basle and Republic of Switzerland, have invented certain new and useful Improvements in Blowing-Engines or Compressors, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to blowing-engines or compressors, and particularly to the construction of valves employed to regulate the admission and delivery from the compression-cylinder, my invention having for its object to provide a valve capable of working with great rapidity and certainty and without noise or destructive shock.

My improvements are applied to slide-valves and are particularly advantageous when used in connection with piston-valves, although in many features my invention can be usefully applied to slide-valves moving over a flat surface. The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated in what I believe to be their best development, and the various features of improvement will be hereinafter pointed out in the claims.

Reference being now had to the drawings, Figure 1 is a vertical section taken through the center of the valve and valve-chamber, showing in connection therewith the compressing-cylinder and parts leading to the valve-chamber. Fig. 2 is an end view of the piston-valve, showing part of the back bearing attached thereto removable. Fig. 3 is a plan view of one of the flap-valves and springs; Fig. 4, an edge view of the same parts; Fig. 5, an end view similar to Fig. 2, showing a modified arrangement of the spring-plates. Fig. 6 is a plan view of the flap-valve and springs as shown in Fig. 5; Fig. 7, an edge view of said valve and spring-plates. Figs. 8 to 11, inclusive, are views showing successive positions of the valve during the operation of the blowing-engine.

A, Fig. 1, indicates the compressing-cylinder, from the ends of which lead the ports A′ A^2, by which the air enters and leaves the compressing-cylinder, said ports, as shown in Fig. 1, opening into the annular ports A^3 and A^4, which for most of their length communicate with the ports A′ and A^2 through the annular chambers a' a^2.

B is the compressing-piston working in the cylinder A.

C and C′ are the cylindrical portions of the piston-valve chamber, in which are formed the ports A^3 A^4.

C^2 shows the connection of the piston-valve chamber with the air-admission passage C^3, and C^4 the communications of the valve-chamber with the receiver for the compressed air.

D is the valve, which, as shown, is in the preferable form of a piston-valve having bars or walls (indicated at D′ D^2) which as the valve reciprocates move alternately to opposite sides of the ports A^3 and A^4.

D^3 and D^4 are the contacting surfaces of the end walls E E of the valve, between which and the walls D′ and D^2 are formed the chambers D^5 and D^6, which communicate with the ends of the valve-chamber through ports E′ E^2 E^3 E^4 E^5, formed in the walls E.

F F indicate flap-valves, preferably made of thin metal and shaped so as to cover the ports E′ E^2, &c., having for this purpose the cross-bars F′, F^2, F^3, F^4, and F^5, separated by slots, as shown. These thin metal valves are preferably formed integral with spring-plates *f*, as shown, said spring-plates being preferably arranged radially, as shown in Figs. 2 and 5, and fastened near the center to the ends of the piston-valve, and where the proper spring strength cannot be secured in a single plate *f*, which may readily be the case owing to the fact that the radial arrangement necessarily limits the breadth of the spring-plate, the desired or necessary strength can be readily secured by securing additional spring-plates, as shown at *f′* f^2, Figs. 5, 6, and 7, on top of the springs *f*.

G G indicate the back bearings for the springs *f*. These back bearings should flare outwardly, as shown, preferably forming segments of a spherical surface to which the springs naturally conform themselves when moved outward from their bearings on the walls E. As shown, the back bearings G are supported on curved radial arms *g′*, extending out from a hub *g*, common to the arms and to the back bearing-plates proper, and

the back bearings are formed with circumferential slots, (indicated at G′, G², G³, and G⁴,) which afford free passage for the air, and are preferably formed, as shown, to register with the slots formed between the cross-bars of the flap-valves.

H indicates the valve-rod by which the piston-valve is actuated.

It will readily be understood that the thin spring-plate valves working on the ports formed in the piston-valve are exceedingly sensitive and quick in their operation, while at the same time their lack of weight avoids any injurious strain or noise in their operation, and the use of the curved back bearing prevents any injurious strain on the spring-plate and also arrests their motion without shock or objectionable noise. The formation of the flap-valves with the alternating slots and cross-bars greatly facilitates the free passage of the air. These features are of importance irrespective of the particular construction of the valve to which they are attached.

Referring now to the general construction illustrated in Figs. 1 and 8 to 11 and referring first to Fig. 8, the parts are in the position in which the piston B is moved upward, and the valve D has also begun its upward movement, the compressed air from the cylinder A flowing through the port A′ and port A³ into the chamber D⁵ and thence through the ports in the wall E, lifting the spring flap-valves and escaping freely into receiver connection C³. In Fig. 9 the wall D′ of the valve is shown as just having closed the port A³, so that the pressure in the chamber D⁵ and in the end of the valve-chamber is the same, which equality permits the spring-valves F to close or to begin to close. In Fig. 10 the valve is shown in its uppermost position, and in Fig. 11 it is shown as having moved downward until the wall D′ is just about to reopen the connection between the port A³ and the chamber D⁵. It will thus be seen that during the entire period elapsing during the motion of the valve from the position shown in Fig. 9 to that shown in Fig. 11 the pressure in the chamber D⁵ has remained the same as that in the receiver. Consequently the spring-valves have ample time to close before the valve reaches the position shown in Fig. 11, after which the pressure in the chamber D⁵ is lower than the pressure in the receiver until substantially the time when the valve reaches the position shown in Fig. 8 and the spring-plates are again raised to permit the outward passage of the air.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a blowing-engine, the combination with a slide-valve moving over a port or ports of the compressing-cylinder and having a series of approximately parallel slots, forming ports, leading through it, through which ports the air from the cylinder is delivered to the receiver, of a spring-plate secured to the back of the valve at one end and extending across the ports, and a light metal flap-valve formed with or attached to the spring, and having cross-bars arranged to extend over the slot-ports with slots separating said bars to give free passage to the air when the valve lifts.

2. In a blowing-engine, the combination with a slide-valve moving over a port or ports of the compressing-cylinder and having a series of approximately parallel slots, forming ports, leading through it, through which ports the air from the cylinder is delivered to the receiver, of a spring-plate secured to the back of the valve at one end and extending across the ports, said spring-plate being of progressively decreasing strength from its point of attachment outward, and a light metal flap-valve formed with or attached to the spring, and having cross-bars arranged to extend over the slot-ports with slots separating said bars to give free passage to the air when the valve lifts.

3. In a blowing-engine, the combination with a slide-valve moving over a port or ports of the compressing-cylinder and having a series of approximately parallel slots, forming ports, leading through it, through which ports the air from the cylinder is delivered to the receiver, of a spring-plate secured to the back of the valve at one end and extending across the ports, a light metal flap-valve formed with or attached to the spring, and having cross-bars arranged to extend over the slot-ports with slots separating said bars to give free passage to the air when the valve lifts, and a back bearing for the flap-valve, flaring away from the slide-valve from the point of attachment of the spring-plate outward over the flap-valve.

4. In a blowing-engine, the combination with a slide-valve moving over a port or ports of the compressing-cylinder and having a series of approximately parallel slots, forming ports, leading through it, through which ports the air from the cylinder is delivered to the receiver, of a spring-plate secured to the back of the valve at one end and extending across the ports, a light metal flap-valve formed with or attached to the spring and having cross-bars arranged to extend over the slot-ports with slots separating said bars to give free passage to the air when the valve lifts, and a back bearing for the flap-valve, flaring away from the slide-valve from the point of attachment of the spring-plate outward over the flap-valve, said back bearing being formed with slots extending through it to permit free escape of air.

5. In a blowing-engine, the combination with a slide-valve moving over a port or ports of the compressing-cylinder and having a series of approximately parallel slots, forming ports, leading through it, through which ports the air from the cylinder is delivered to the receiver, of a spring-plate secured to the back of the valve at one end and extending

across the ports, a light metal flap-valve formed with or attached to the spring and having cross-bars arranged to extend over the slot-ports with slots separating said bars to give free passage to the air when the valve lifts, and a back bearing for the flap-valve, flaring away from the slide-valve from the point of attachment of the spring-plate outward over the flap-valve, said back bearing being formed with slots extending through it and registering with the slots formed between the cross-bars of the flap-valve, to permit free escape of air.

6. In a blowing-engine, the combination with a slide-valve moving over a port or ports of the compressing-cylinder and having a series of approximately parallel slots, forming ports, leading through it, through which ports the air from the cylinder is delivered to the receiver, of a spring-plate secured to the back of the valve at one end and extending across the ports, said spring-plate being of progressively-decreasing strength from its point of attachment outward, and having cross-bars formed integral with it, or with a portion of it, which extend over the slot-ports in the slide-valve and have slots separating said cross-bars.

7. In a blowing-engine, the combination with a slide-valve moving over a port or ports of the compressing-cylinder and having a series of radially-arranged groups of approximately concentric slots leading through it, through which ports the air from the compressing-cylinder is delivered to the receiver, of a series of radially-arranged spring-plates, one extending over each group of concentric slot-ports, and each secured to the slide-valve at its inner end, and a light metal flap-valve secured to each spring and made up of a series of cross-bars arranged to extend over the slots of the group of ports, with slots separating said bars, to give free passage to the air when the flap-valve opens.

8. In a blowing-engine, the combination with a slide-valve moving over a port or ports of the compressing-cylinder and having a series of radially-arranged groups of approximately concentric slots leading through it, through which ports the air from the compressing-cylinder is delivered to the receiver, of a series of radially-arranged spring-plates, one extending over each group of concentric slot-ports, and each secured to the slide-valve at its inner end, a light metal flap-valve secured to each spring and made up of a series of cross-bars arranged to extend over the slots of the group of ports, with slots separating said bars to give free passage to the air when the flap-valve opens, and a back bearing for the series of valves having substantially the form of a spherical segment.

9. In a blowing-engine, a piston-valve regulating the admission and delivery of the compressing-cylinder, said valve being formed with chambers D^5, D^6, said chambers connecting with the receiver of the engine through ports in the ends of the piston-valve, and with the ports of the compressing-cylinder through ports in the walls of said piston-valve, a series of thin metal flap-valves operating to close the ports in the ends of the piston-valve, a series of radially-arranged plate-springs secured on the ends of the piston-valve and acting to hold the flap-valves to their seats, and back bearings for said valves, also secured to the ends of the piston-valves, and flaring outward in substantially the form of spherical segments.

10. In a blowing-engine, a piston-valve regulating the admission and delivery of the compressing-cylinder, said valve being formed with chambers D^5, D^6, lying within the heads of the valve, ports formed through the walls of the valve whereby the chambers connect with the ports of the compressing-cylinder, and a series of concentrically-arranged radial groups of ports formed in the heads of the valve, in combination with a series of radially-arranged plate-springs secured to the piston-valve heads at their inner ends and each extending over one group of ports, a series of light metal flap-valves, one secured to each spring, and each having cross-bars arranged to extend over the slots of the group of ports with slots separating said cross-bars, and a back bearing for the valves of substantially spherical section.

EDWARD WIKI.

Witnesses:
GEORGE GIFFORD,
HERMAN STEBLER.