

(No Model.)

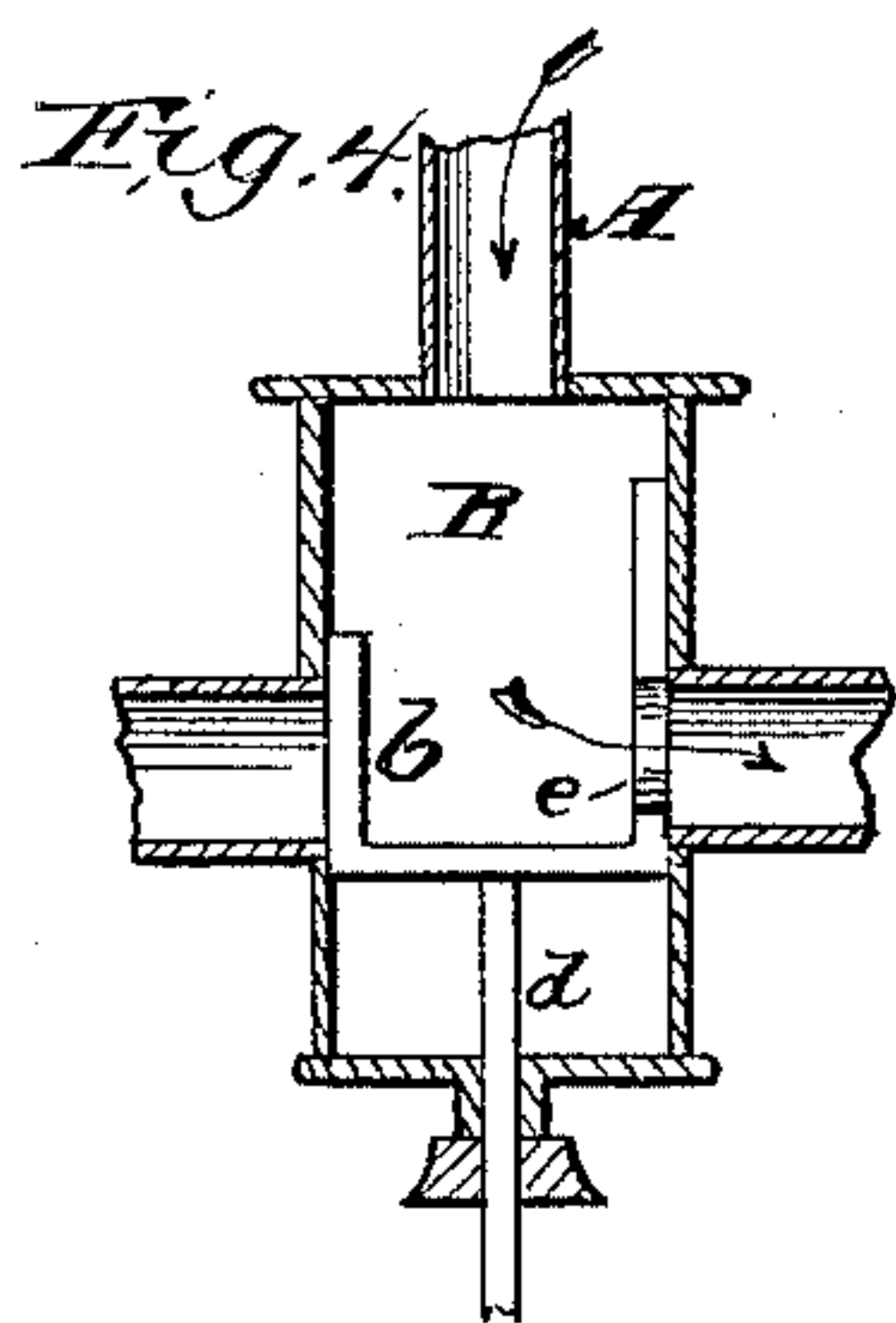
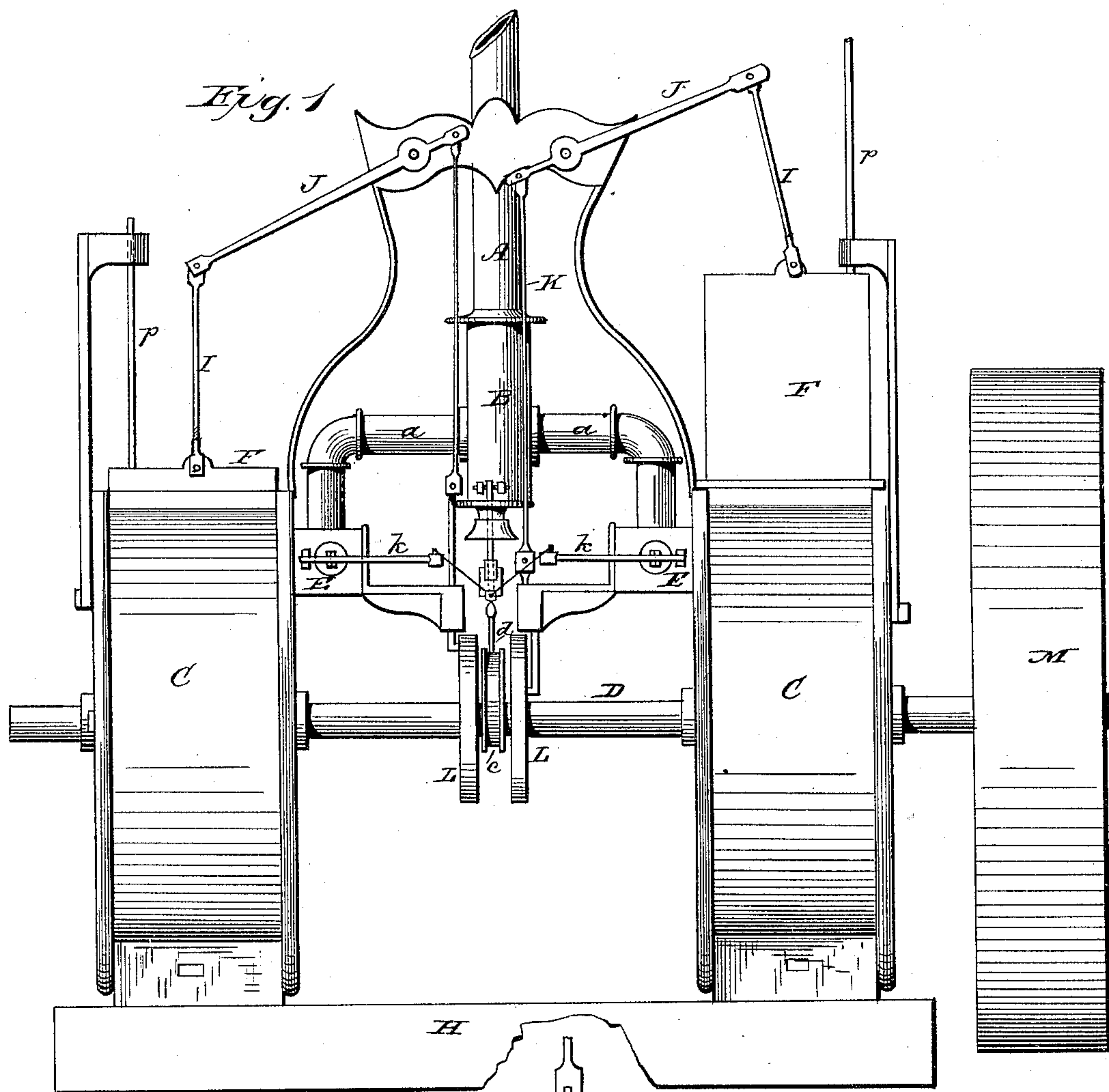
2 Sheets—Sheet 1.

C. A. SHALER.

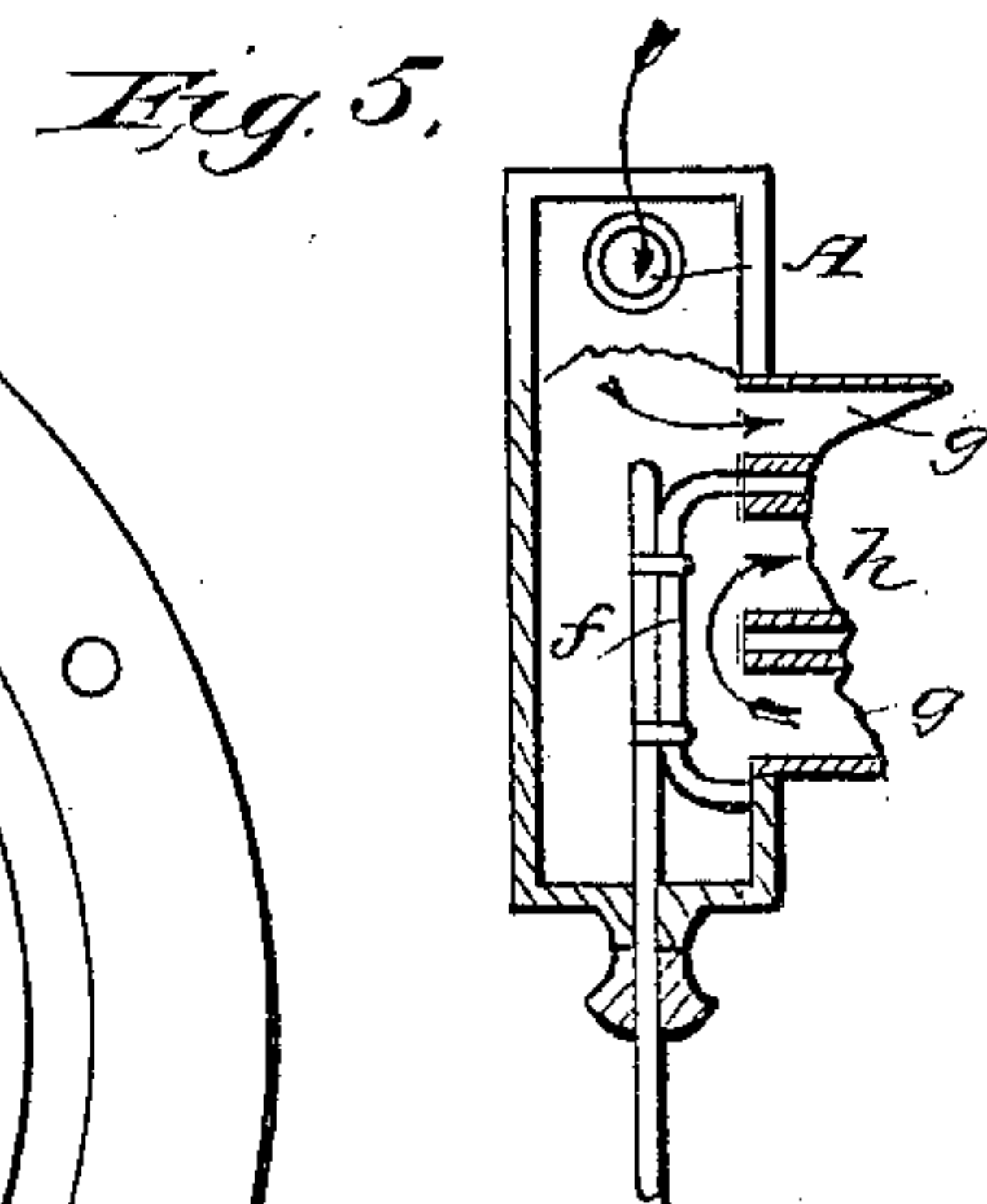
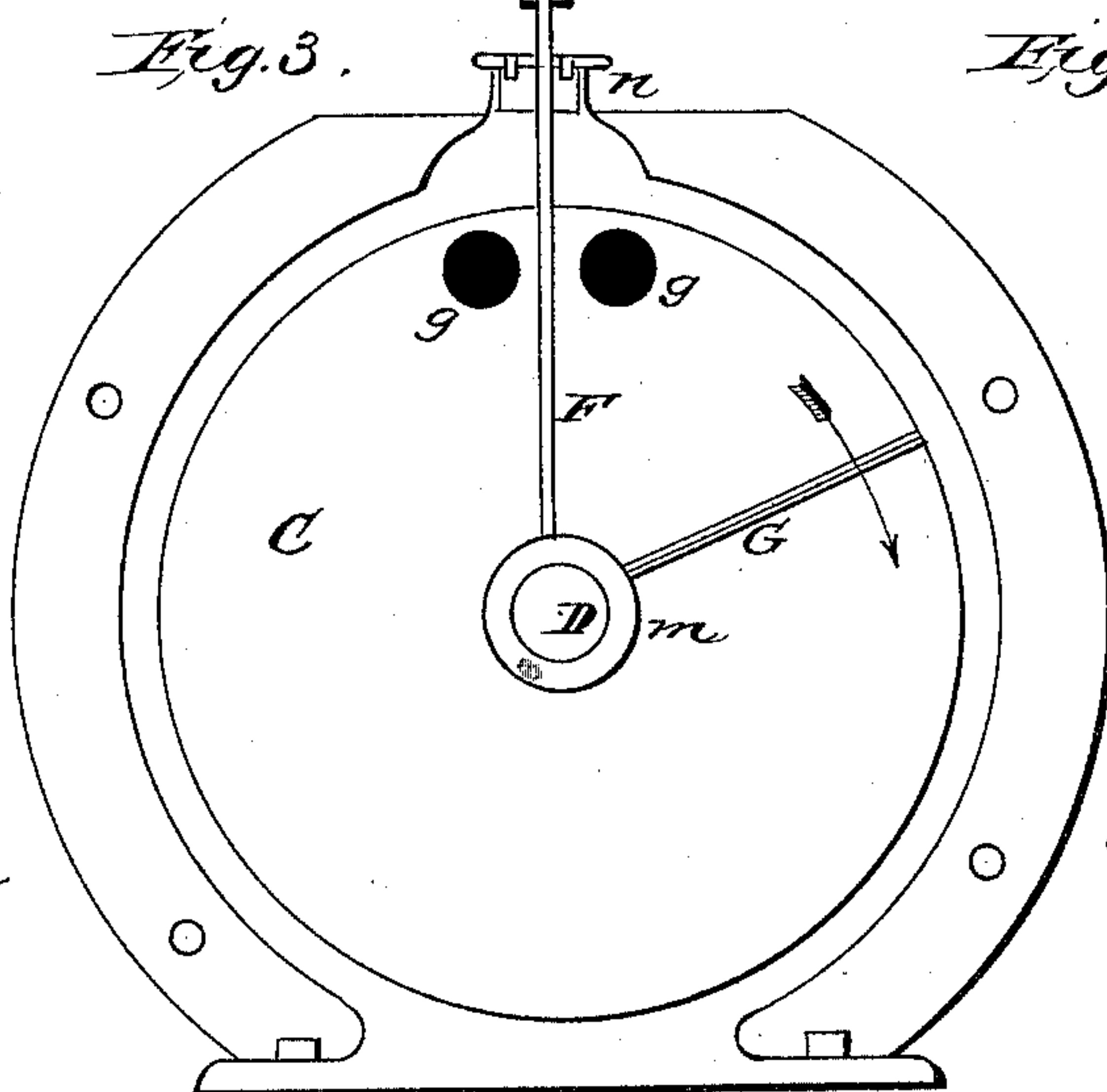
ROTARY ENGINE.

No. 286,232.

Patented Oct. 9, 1883.



WITNESSES
J. L. Ourand,
M. E. Oliphant



INVENTOR
Clarence A. Shaler.
per *Chas. H. Fowler*
Attorney

(No Model.)

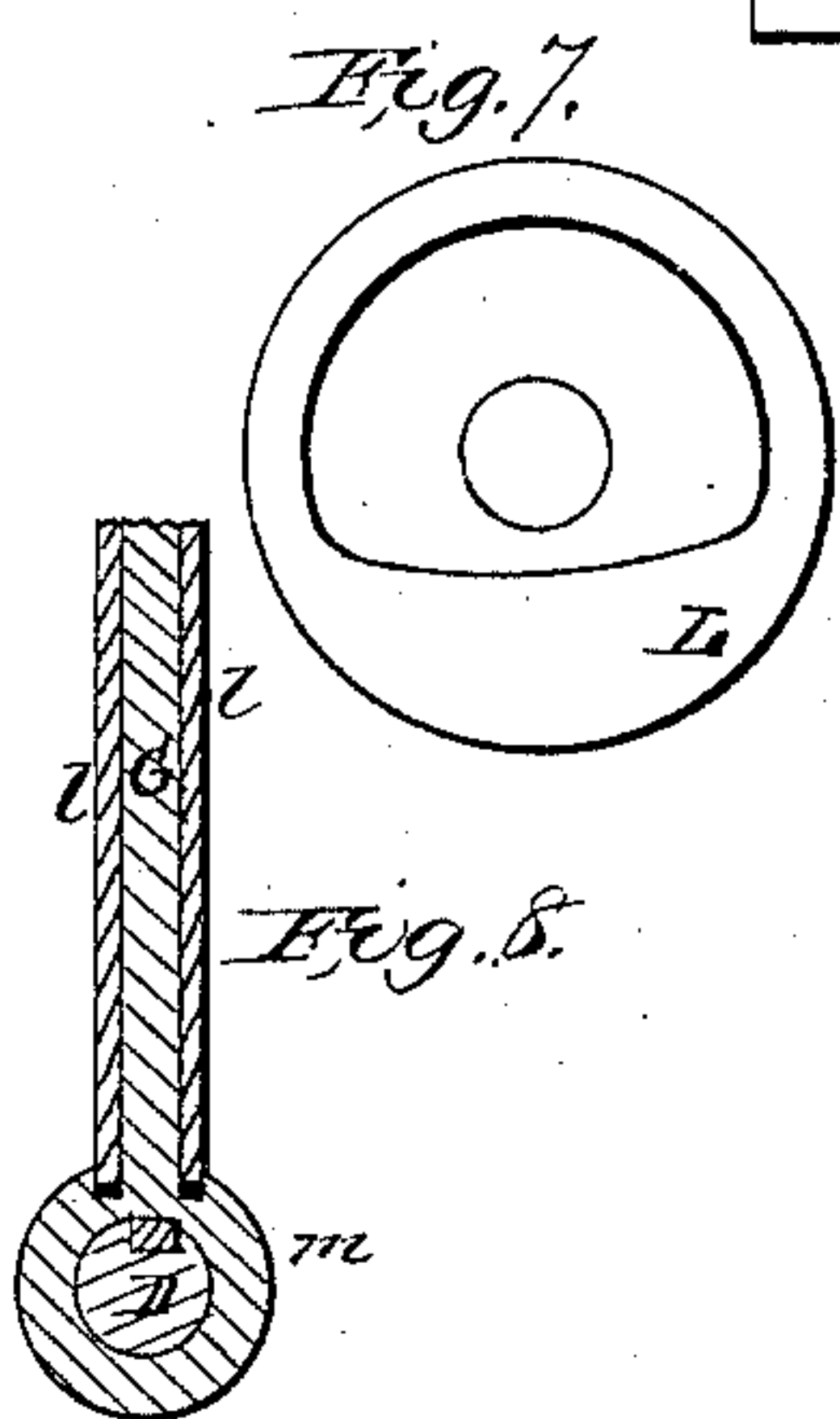
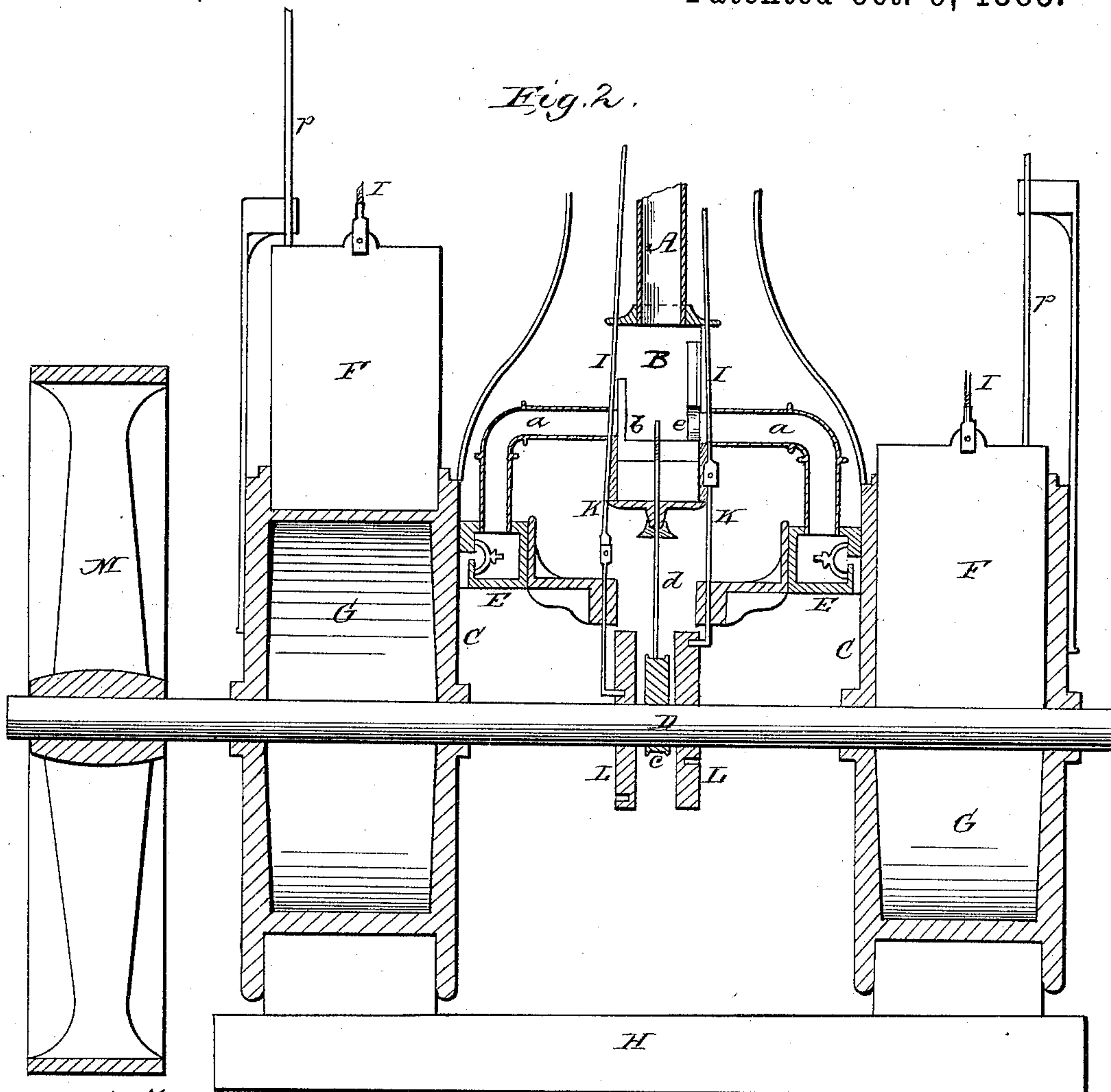
2 Sheets—Sheet 2.

C. A. SHALER.

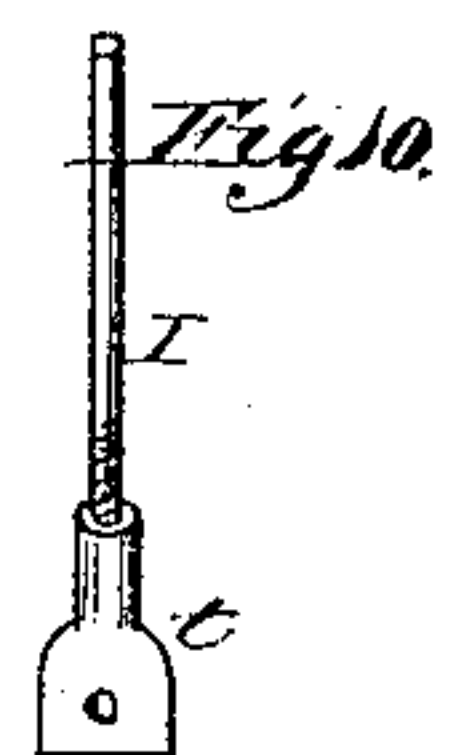
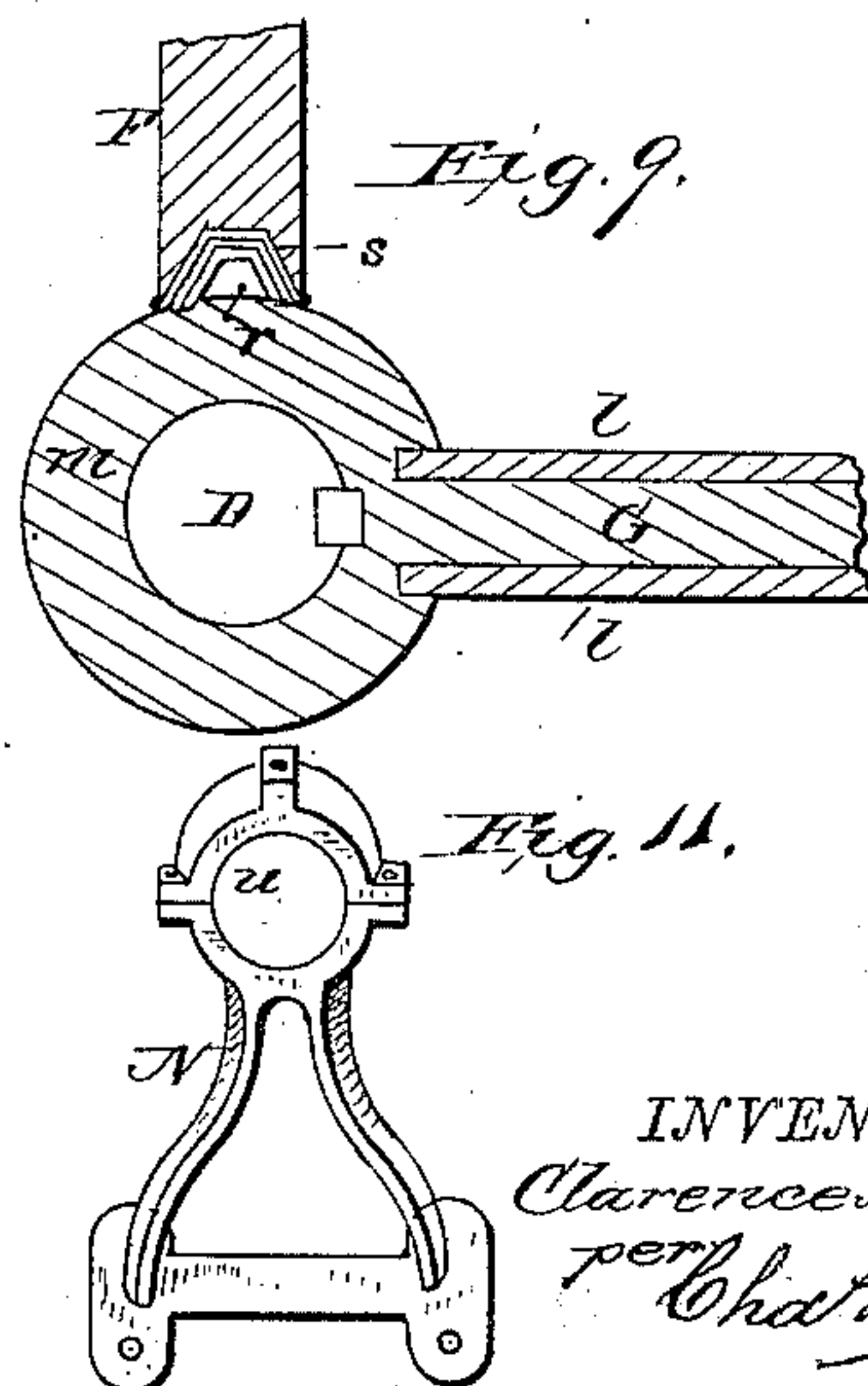
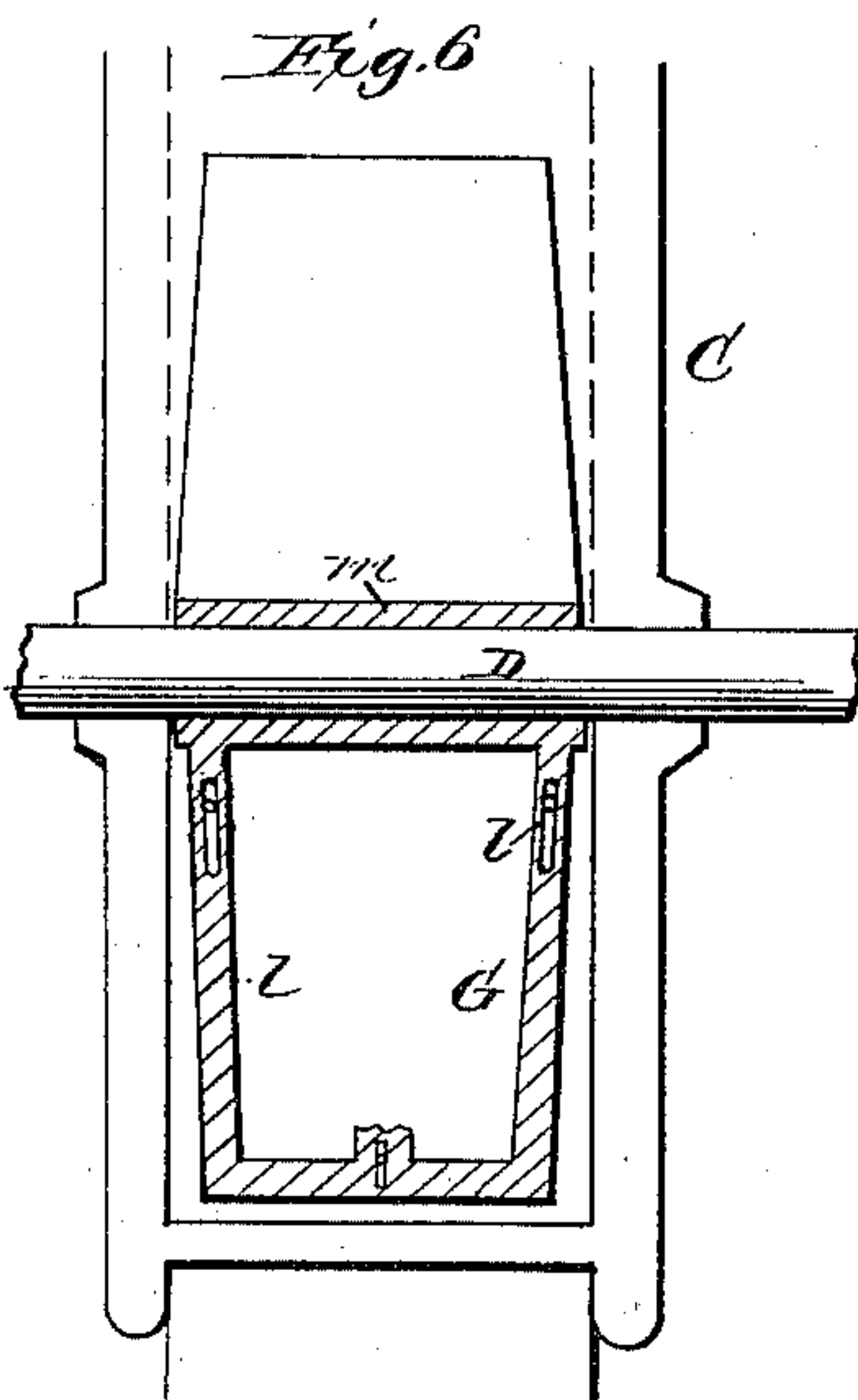
ROTARY ENGINE.

No. 286,232.

Patented Oct. 9, 1883.



WITNESSES
J. L. Curand
H. E. Oliphant



INVENTOR
Clarence A. Shaler
per
Chas. H. Fowler
Attorney

UNITED STATES PATENT OFFICE.

CLARENCE A. SHALER, OF FOX LAKE, WISCONSIN.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 286,232, dated October 9, 1883.

Application filed May 28, 1883. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE A. SHALER, a citizen of the United States, residing at Fox Lake, in the county of Dodge and State of Wisconsin, have invented certain new and useful Improvements in Rotary Engines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a front plan view of a rotary engine constructed in accordance with my invention; Fig. 2, a sectional view thereof; Fig. 3, a detail view of one of the cylinders, showing the interior thereof and the relative position of the slide and fan. Fig. 4 is a detail sectional view of the steam-chest; Fig. 5, a similar view of the steam-chest for reversing engine; Fig. 6, a detail sectional view of cylinder, showing fan and packing thereof. Fig. 7 is a detail side view of the cam. Fig. 8 is a sectional view, in detail, of the fan that revolves in cylinders, showing the manner of connecting it to the main shaft. Fig. 9 is a similar view of the fan and slide; Fig. 10, a detail view, showing the manner of attaching the rod to the slides; and Fig. 11 is a detail view, in perspective, of bracket for supporting main shaft outside of cylinders.

The present invention has relation to certain new and useful improvements in rotary engines; and it consists, principally, of two cylinders, through the center of which a shaft extends, having two fans attached to the opposite sides thereof, and at such a distance apart that either fan may revolve in its own cylinder, through the radii of which a slide slips out and in directly behind the fans, so that when in a steam-tight box a partition is formed behind the fan, the steam acting on only one fan at a time to press it half-way around, when it changes to the other cylinder and acts in like manner to carry it the rest of the way around. Thus the shaft is rotated and carries with it the balance-wheel or other fixture connected thereto.

The objects of the invention are to improve and simplify the general construction of the several parts of the engine, whereby the operation thereof is more perfect, and a great-

er power with less friction is obtained; and the invention therefore consists in the special construction of the above-enumerated parts, in connection with other features of the invention, substantially as shown in the drawings and hereinafter described and claimed.

In the accompanying drawings, A represents the feed-pipe leading from the boiler into the steam-chest B, which has an outlet, *a*, upon each side thereof, leading into the cylinders C, as more clearly shown in Fig. 2. Within the steam-chest B is located a valve, *b*, the valve-stem *d* thereof being acted upon by the eccentric *c*, connected to the main shaft D, thus operating the valve in such a manner that the steam is alternately shut off from one cylinder and discharged into the other through the pipes *a*. The construction of the valve *b* is more clearly shown in Fig. 4, and has an opening, *e*, and when said opening is in position to register with the opening in one of the pipes *a*, the opening in the opposite pipe will be closed, and vice versa, thus admitting steam, as shown by arrows.

The steam-chests E (shown in detail, Fig. 5) are for the purpose of reversing the engine, and with these chests the pipes *a* communicate, said chests having the valve *f*, of the usual form which always cover one of the openings *g*, leading into the cylinder C, and the exhaust leading into the air, as indicated at *h*. The openings *g* communicate with the cylinder C upon each side of the slide F, as shown in Fig. 3, and the steam, when escaping into the chest B, passes into the cylinder C through pipe *a*, and through the upper one of the openings *g*, as shown in Fig. 5, and the steam ahead of fan G in Fig. 2 is driven out of the opening *g* upon the left of the slide F, or, as in Fig. 5, that one of the openings *g* at the lower part of the chest E, and then out through the exhaust *h*, (indicated by the arrows.) When the valve *f* is changed from the position shown, the steam is let in on the other side of slide F, and the fan G is driven in an opposite direction. The stems *i* of the valves *f* are operated by levers *k* in such manner that both valves are changed at the same time. The cylinders C are bolted to a suitable bed-plate, H, and the shaft D passes through their centers, the cylinders being tapering at that point, or de-

creasing in width toward their outer edge or periphery, as shown in Fig. 6. Through the radii, or, generally, a radius, perpendicular to the bed-plate, a slot is cut into each side or end, and through the circumference or outside of cylinder, so that a slide F can move in and out to and against the shaft D, as shown. The fans G are fastened to main shaft D, as shown in Figs. 8 and 9, and are carried around in the cylinders C, to rotate said shaft. These fans G are tapered to fit the interior taper of the cylinders C, and are packed by movable plates *l*, which, when pressed out, act as wedges against the tapered surface of the cylinder, thus fitting all parts close, after which the plates are secured in place by set-screws. The fans G, as should be understood, are secured to the opposite sides of the shaft D, so that when one is up the other will be down. The fans may be secured on the shaft in any suitable manner that will prevent them from turning, in the present instance a key or feather being used for the purpose, and the fan cast with an eye, *m*, through which the shaft passes. The packing-plates *l* extend into a slot formed on the periphery of the eye *m*, so that as these plates are moved out to fit cylinder C they will move a certain extent out of slot, but leave no part of fan unpacked, the heads of cylinders also being calculated to press against the ends of the eye, so as to make it steam-tight, thus allowing no steam to escape around the entrance of main shaft. The slides F are properly packed by suitable packing-boxes, *n*, located upon the outer periphery of the cylinders, through which the slides extend, the packing being also assisted by the pressure of steam. When the machine or engine is in operation, these slides are operated by levers I and levers J, the latter being pivoted to frame K, and having connected to their inner ends rods L.

The levers I are connected at their lower ends to the slides E, and at their upper ends to the levers J, while the rods K are jointed at their lower ends, and, after passing through suitable boxing, engage with cams L, said cams being shown in detail, Fig. 7. These cams L are secured on the shaft D, and are disposed with relation to each other and hung on the shaft in such a way that both slides F are never in motion at the same time, and are so formed that both are down at the same time for an instant while the steam changes from one cylinder to the other, and in this manner utilize the slight leakage of steam both ways as the valve changes. These cams L are so formed that they will raise the slides F just ahead of the fans G, and put them down as soon as fans have passed.

To the slides F are attached guide-rods *p*, which work in boxes of suitable construction, the object being to guide the slides in their movement, and to the shaft D is secured a suitable balance-wheel, M.

In the construction of the slides F a packing, *r*, of wood, may be employed, connected to the inner end thereof, a tapering groove being

formed for the reception of said packing, and also a packing composed of layers *s*, of felt. The layers *s* are placed in this groove so that the ends or edges will project beyond the end of the slide; or, in other words, they are made sufficiently long for this purpose; and the wooden block *r* is curved on its outer surface to fit the eye *m* of the fan G.

It will be seen by this construction that the pressure on the layers *s*, of felt, will tend to force them against the wooden block *r* and against the surface of the eye *m*.

Although I prefer to use felt for the layers *s*, any other suitable material may be substituted ordinarily used for packing, and the block *r* may be composed of any suitable material adapted to the purpose. The engine will be supplied with a suitable governor to regulate the supply from the boiler.

In Fig. 10 I have shown the means most preferable of attaching the rod I to the slide F, the end of the rod being screw-threaded and engaging with a screw-threaded coupling, *t*, connected to the slide, thus admitting the shortening or lengthening of the point of connection between the slide F and lever J, and thereby adjust the motion of the former. The cut-off valves operated by eccentric on main shaft may also have a screw-rod and coupling of similar construction and for like purpose, only in the present case it would screw into band or rim of the eccentric.

In Fig. 11 a bracket is represented, (shown at N,) which has a bearing, *u*, for supporting main shaft D outside of cylinders, said bracket being bolted to bed-plate H of engine, and tends to relieve weight from centers of cylinders and carry weight of balance-wheel, also strains against the main shaft. In small engines this bracket will not be necessary, such as two-horse power and under.

The cylinders C are intended to be provided with stop-cocks at their lower sides, near bed-plate, for the purpose of drawing off condensed steam or water.

It will be seen that an engine constructed in accordance with my invention will have no dead-centers, and every particle of steam is utilized, for, as the valve changes, both slides are down, and steam will consequently be taken in both cylinders until the full force is changed to one fan or the other. It follows, therefore, that there is no point in its revolution where the pressure is not always the same, provided there is a continuous pressure from the boiler. In the working of the slides, they do not begin to move until the pressure is removed, so that the force required to raise and shut them is very small.

One of the valuable features of my invention is that it takes comparatively little steam to run it. It is compact, simple as well as powerful, and the simplicity of its reverse is an especially commendable feature.

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

1. The cylinders C and slides F, and the fans G, in combination with the steam-chest B and valve *b*, and the steam-chests E and valves *f*, and means for operating them, substantially as and for the purpose specified.

2. The cylinder C, formed tapering from the center to the circumference upon its interior, in combination with the tapering fans G, provided with the adjustable packing-plates *l*, and the slide F, substantially as and for the purpose described.

3. In a two-cylinder rotary engine, the steam-chest B and pipes *a*, communicating therewith, in combination with the valve *b*, constructed, as described, with the opening *e*, the rod *d*, and eccentric *c*, for operating it, substantially as and for the purpose specified.

4. The combination, with the fan G, of the slide F, having a tapering groove at its inner end, and containing a series of packing-layers, *s*, and tapering block *r*, substantially as and for the purpose set forth.

5. The cylinders C, slides F, fans G, steam-chests B E, and valves *b f*, in combination with the cams L, eccentric *c*, rods K, levers J I, and the rod *d*, substantially as and for the purpose described.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

CLARENCE A. SHALER.

Witnesses:

GEO. A. HUNTER,

R. S. HUNTER.