(No Model.) 3 Sheets—Sheet 1.

I. T. DYER.

ROTARY FLUID COMPRESSING ENGINE.

No. 559,324. Patented Apr. 28, 1896.

Fig. 1.

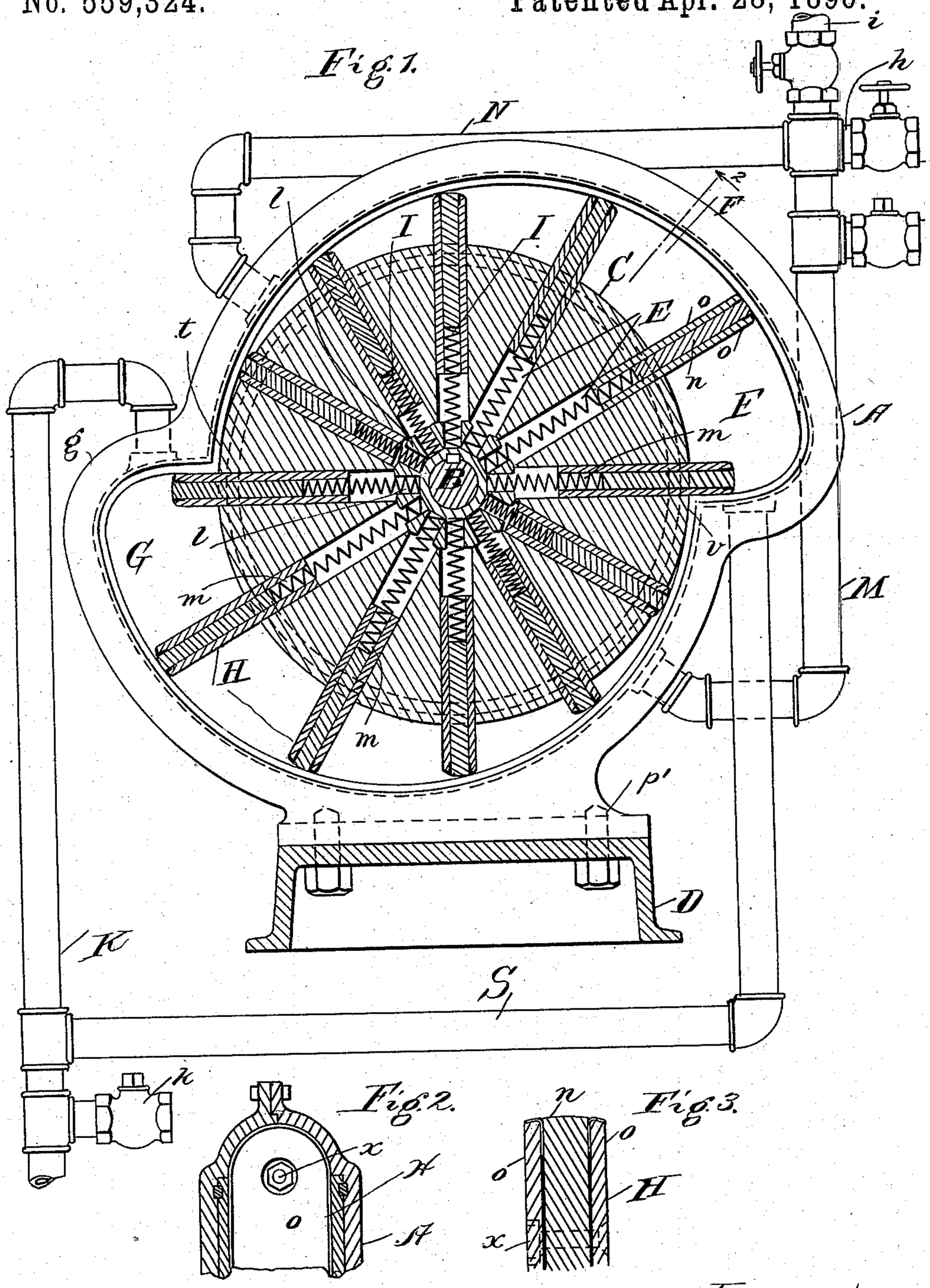

Fig. 2.

Fig. 3.

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Fig 4

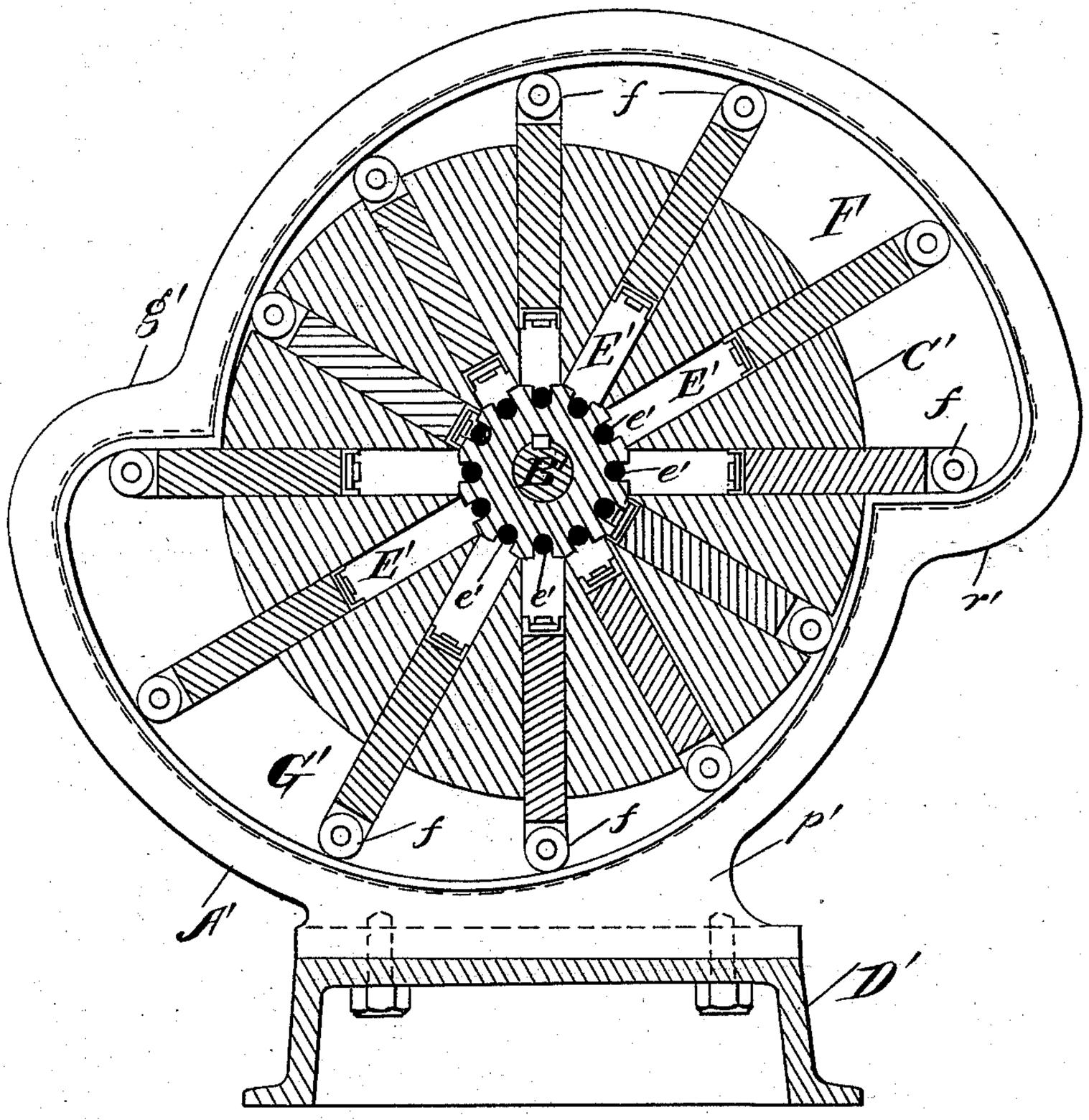

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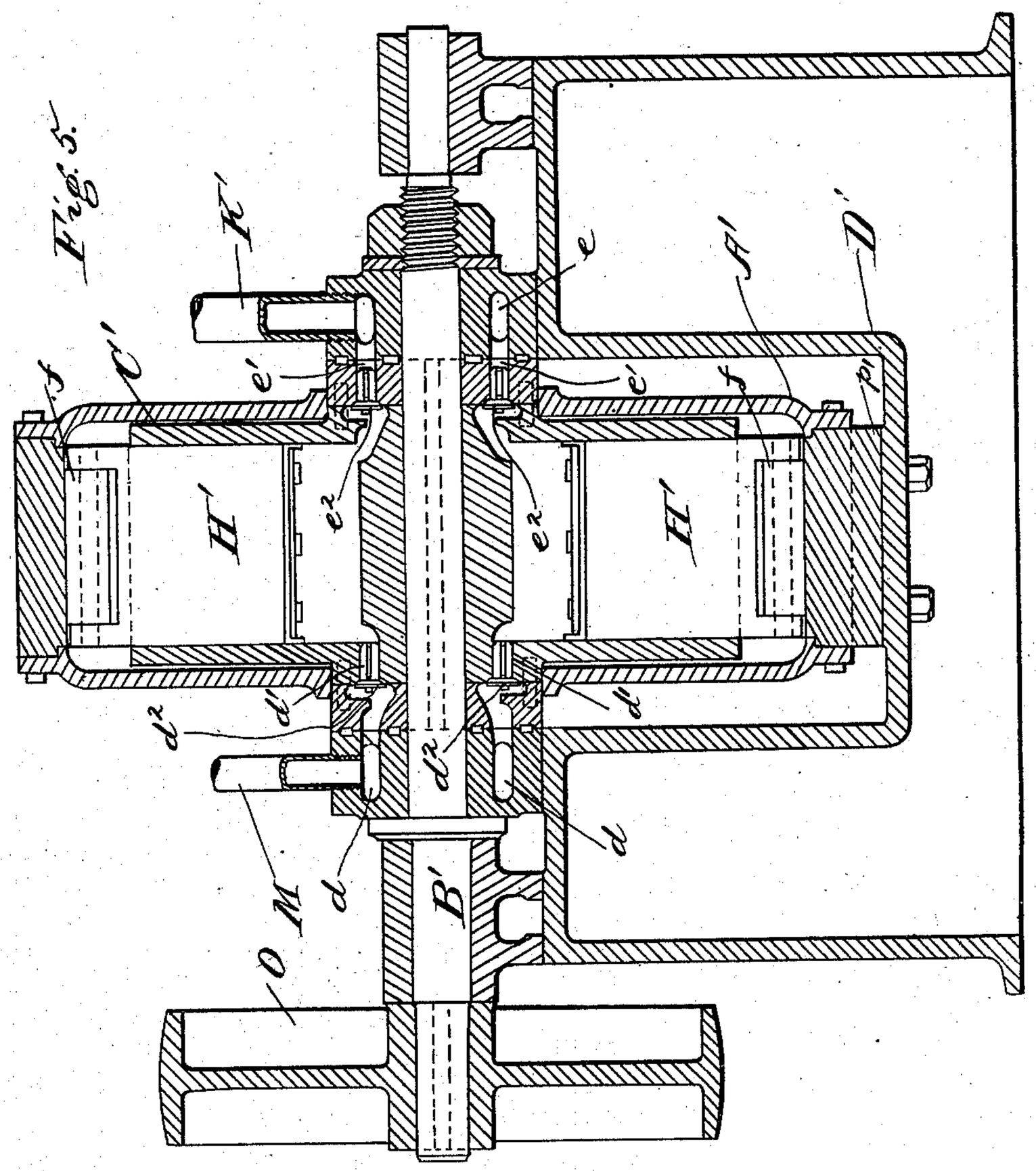
Fig. 5.



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UNITED STATES PATENT OFFICE.

ISAAC T. DYER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO CHARLES J. STROMBERG, OF SAME PLACE.

ROTARY FLUID-COMPRESSING ENGINE.

SPECIFICATION forming part of Letters Patent No. 559,324, dated April 28, 1896.

Application filed May 13, 1895. Serial No. 549,045. (No model.)

To all whom it may concern:

Be it known that I, ISAAC T. DYER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Rotary Fluid-Compressing Engines, of which the following is a specification.

The primary object of my invention is to provide a construction of rotary engine adapted for compressing fluid introduced into it, either as the exhaust fluid from another engine or fluid from any other source, (as air at normal pressure,) to a high degree of pressure for use as power.

My invention consists in the general construction of my improved engine, and it also consists in details of construction and combinations of parts, all as hereinafter set forth.

In the accompanying drawings, Figure 1 is a vertical sectional view of my improved fluid-compressing engine; Fig. 2, a broken section taken at the line 2 on Fig. 1 and viewed in the direction of the arrow; Fig. 3, a broken sectional view of a piston detail; Fig. 4, a view like that presented by Fig. 1, showing a modified construction of the invention; and Fig. 5, a vertical sectional view of the engine illustrated in Fig. 4.

A, Fig. 1, is the case, of the shape in cross-section illustrated in Fig. 2, being formed in sections bolted together, as indicated. The circumferential shape of the case A, at least inside, and also by preference outside, as shown, is that of two semicircles or approximate semicircles placed one above the other to cause one end of the upper section to be within the plane of the other section and the opposite end of the upper section to extend beyond the adjacent end of the lower one, the junction of the adjacent ends affording offsets *r* and *q*. The case is supported at a seat portion *p*, extending from the bottom of its lower section, on a base D.

Midway between the two centers upon which the semicircular upper and lower sections of the case A are described is journaled in the opposite sides of the latter a rotary shaft B, carrying a disk-shaped head C, containing a desired number of radial chambers E, which should be equidistant apart, and the diameter of the head is such as to cause it to fit closely in the case, which is suitably lined, between the diagonally-opposite ends at *v* and *t*. The internal shape of the case affords chambers F and G on opposite sides of the periphery of the rotary head C, which are largest at the offsets *r* and *q* and taper thence longitudinally to the opposite ends of the respective sections. In the radial chambers E are confined to reciprocate radially therein the abutments or pistons H, which should be formed of metal, each comprising the two flat side pieces *o o* and the central shorter piece *n*, extending flush with the outer ends of the sides pieces and leaving at its inner end a socket *m*. The pieces forming each piston are bolted flatwise together, as indicated at *x* in Figs. 2 and 3, and the width of each piston is such as to cause it to fit closely between the opposite inner sides of the case. About the hub of the head C are formed radial sockets *l* to receive the inner ends of spiral springs I, confined at their outer ends in the sockets *m*.

K is a feed-pipe for the fluid to be compressed in the case A, leading from the supply, which may be the exhaust of an air engine or motor, into the chamber G at the offset *q*, and having a branch S leading into the chamber F at the offset *r*. In the pipe K, I provide an inwardly-opening check-valve *k*, through which to draw in atmospheric air at normal pressure when that is the fluid to be compressed in the chambers F and G, as hereinafter described.

M and N are exhaust-pipes leading, respectively, from the reduced ends of the chambers F and G to the valve-controlled outlets *i* and *h*, which may lead to a holder (not shown) or to another engine to be driven.

The operation of the engine as thus described is as follows: Fluid (as the exhaust fluid from an engine) is introduced through the pipes K and S into the chambers G and F while the head C is rotated. In the rotation of the head the pistons, on their way to the tapering ends of the chambers, are forced inward against the resistance of their springs I, which maintain them, at their outer ends, always in contact with the inner peripheral

surfaces of the semicircular portion of the case. The fluid escapes at the outlets into the pipes M and N.

Air at normal pressure may be the fluid introduced into the chambers G and F through the check-valve *k*.

The shaft B and head C require to be driven from an extraneous source, as by gearing the shaft to a suitable driving power, for which purpose it should carry a belt-pulley like that marked O and shown on the shaft of the engine, as represented by Fig. 5.

The modified construction illustrated in Figs. 4 and 5 involves the same principle as that of the construction already described—that is to say, fluid the pressure of which is to be increased is introduced into the engine and is compressed therein by the coöperative action upon it of the walls of the narrowing chambers and the radially-movable pistons. By the modified construction, however, the arrangement is such as to cause the pistons to exert the compression action on the fluid at their inner ends.

The case A′ involves the same construction as the case A to produce the tapering chambers G′ and F′, and B′ is a rotary shaft carrying a disk-shaped head C′, containing a desired number of radial chambers E′, in each of which is reciprocably confined a piston H′, adapted to be extended to the inner periphery of each semicircular portion of the case beyond the offsets *r′* and *q′*, and each piston carries at its outer end as a bearing an anti-friction-roller *f*. As in the construction shown in Fig. 1, the case A′ is provided on its lower section with a seat portion *p′*, at which it is supported on a base D′.

In the hub portion of the rotary head C′, at one side of the latter, there is an annular chamber *e*, to which there leads a fluid-inlet pipe K′, and from this chamber there lead, through the hub portion, ducts *e′*, one to the inner end of each radial chamber E′, and each is provided with an inwardly-opening check-valve e^2. At the opposite side of the head C′, in its hub portion, is provided an annular chamber *d*, from which extends a discharge-pipe M′, leading to a suitable holder (not shown) for compressed fluid or to any point for using the compressed fluid as power. From the inner end of each piston-chamber E′, at its side adjacent to the chamber *d*, there leads into the latter a duct *d′*, provided with an outwardly-opening check-valve d^2.

When the engine involving this modified construction is used alone, it requires to be driven by power applied to its rotary shaft B′, and to that end the belt-pulley O is provided, and its operation is as follows:

Fluid (as exhaust-air under pressure from an engine) introduced through the supply-pipe K′ into the annular chamber *e* while the head C′ is being rotated enters the ducts *e′*, and thence enters the radial chambers E′ at the inner ends of the pistons H′, wherein it tends to force the latter outward. The pressure of the fluid in the chambers E′ is overcome by the cam action of the peripheral walls of the chambers G′ and F′ as the rotation of the head C′ carries the pistons toward the contracted ends of these chambers, whereby the pistons are forced inward, thereby compressing the fluid behind them, which is forced out, with its pressure greatly increased, through the ducts *d′* into the annular chamber *d*, whence the discharge-pipe M′ leads.

As will be seen, the principle of operation of either of the described constructions is the same, since both involve the case containing the tapering compression-chambers formed with the rotary heads containing the radially-reciprocating pistons actuated by the walls of the chambers to coöperate therewith to compress the fluid introduced into the chambers. It may be suggested, however, that I intend to employ the engine of the construction shown by Figs. 4 and 5 on the shaft of that represented in Fig. 1, when the fluid-pressure introduced in the latter for driving it will serve to drive the rotary heads of both engines.

So long as the engine contains in its case the tapering-chamber construction with the rotary head it is immaterial for the construction illustrated by Fig. 1 how the pistons H are caused to operate, whether as abutments movable by contact with the peripheral wall of the chamber or otherwise. Hence I do not necessarily limit the construction to the radially-reciprocable piston-abutments.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a rotary fluid-compressing engine, a case containing an inlet and an outlet for the fluid and inclosing a rotary circular head on a shaft and forming in the case a chamber tapering from one end to the other, and abutments extending radially from said head into engagement with the peripheral wall of said chamber, substantially as and for the purpose set forth.

2. In a rotary fluid-compressing engine, a case containing an inlet and an outlet for the fluid and inclosing a rotary circular head on a shaft and forming in the case a chamber tapering from one end to the other, said head containing radial chambers, and pistons reciprocably confined in said radial chambers to extend into engagement with the peripheral wall of said tapering chamber, substantially as and for the purpose set forth.

3. In a rotary fluid-compressing engine, a case containing an inlet and an outlet for the fluid and formed in the upper and lower semicircular sections connected eccentrically at their ends and there affording offsets, a rotary circular head on a shaft in the case on a center between those on which said case-sections are described, said head containing radial piston-chambers and contacting with the inner walls of the case near said abutments and forming within the case the upper and lower

tapering chambers, and pistons reciprocably confined in said radial chambers to extend into engagement with the peripheral walls of said tapering chambers, substantially as and for the purpose set forth.

4. In a rotary fluid-compressing engine, a case A formed in the upper and lower semicircular sections connected eccentrically at their ends and there affording the offsets *r* and *q*, a rotary circular head C on a shaft B in the case on a center between those on which said case-sections are described, said head containing radial piston-chambers E and contacting with the inner walls of the case near said offsets and forming within the case the tapering chambers G and F, provided with fluid-inlets at their larger ends and with fluid-outlets at their smaller ends, and spring-controlled pistons H confined in said radial chambers to extend into engagement with the peripheral walls of said tapering chambers, substantially as and for the purpose set forth.

5. A rotary fluid-compressing engine comprising, in combination, a case A formed in the upper and lower semicircular sections connected eccentrically at their ends and there affording the offsets *r* and *q* provided with fluid-inlets, a rotary circular head C on a shaft B in the case on a center between those on which said case-sections are described, said head containing radial piston-chambers E and contacting with the inner walls of the case near said offsets and forming within the case the tapering chambers G and F provided with outlets at their smaller ends, pistons H reciprocably confined in said radial chambers and having sockets in their inner ends, springs confined in said sockets to extend the pistons into engagement with the peripheral walls of said tapering chambers, feed-pipes leading to said inlets and exhaust-pipes leading from said outlets, substantially as and for the purpose set forth.

ISAAC T. DYER.

In presence of—
J. H. LEE,
J. N. HANSON.