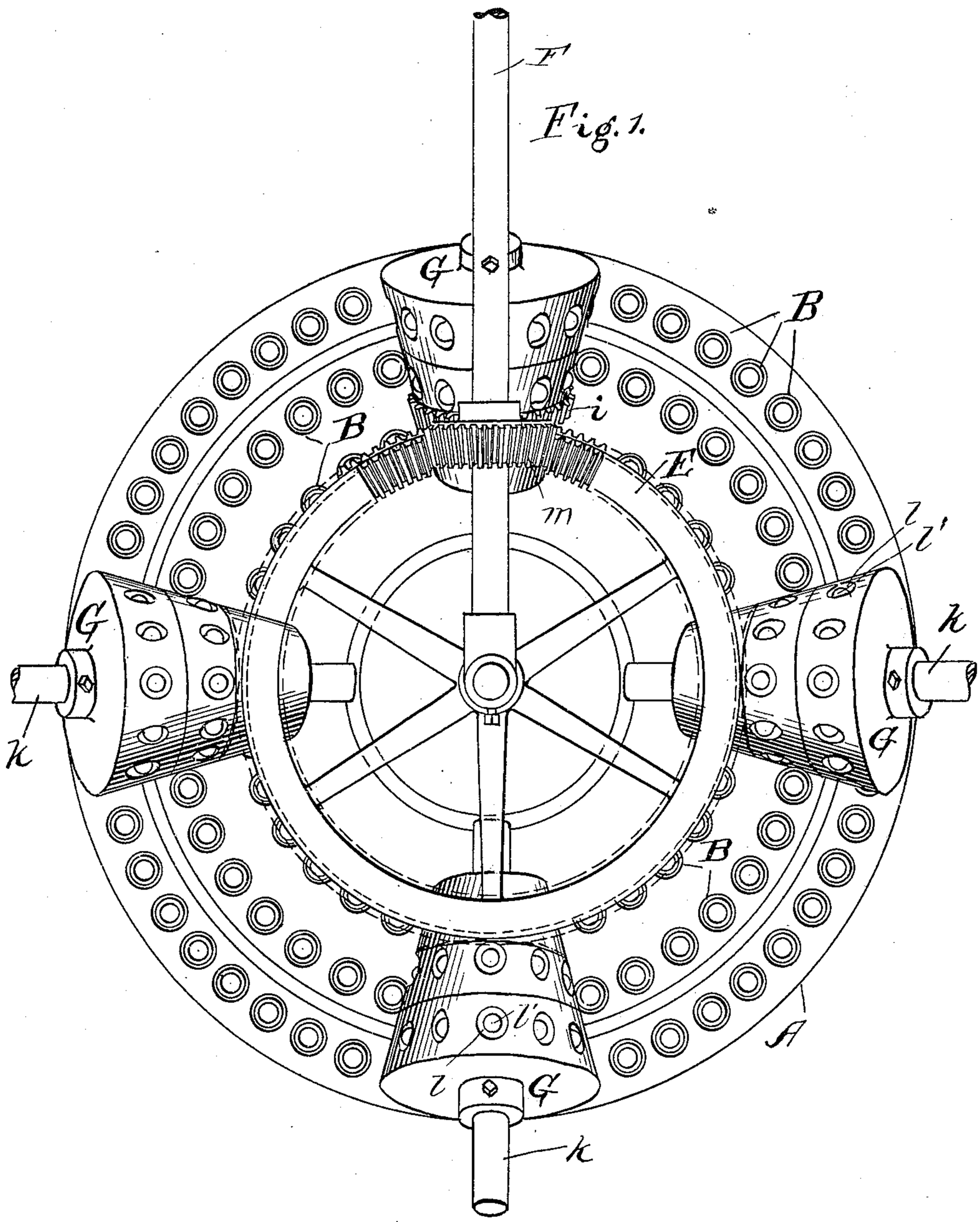
(No Model.) 4 Sheets—Sheet 1.

I. T. DYER.

MACHINE FOR GENERATING FLUID PRESSURE POWER.

No. 566,897. Patented Sept. 1, 1896.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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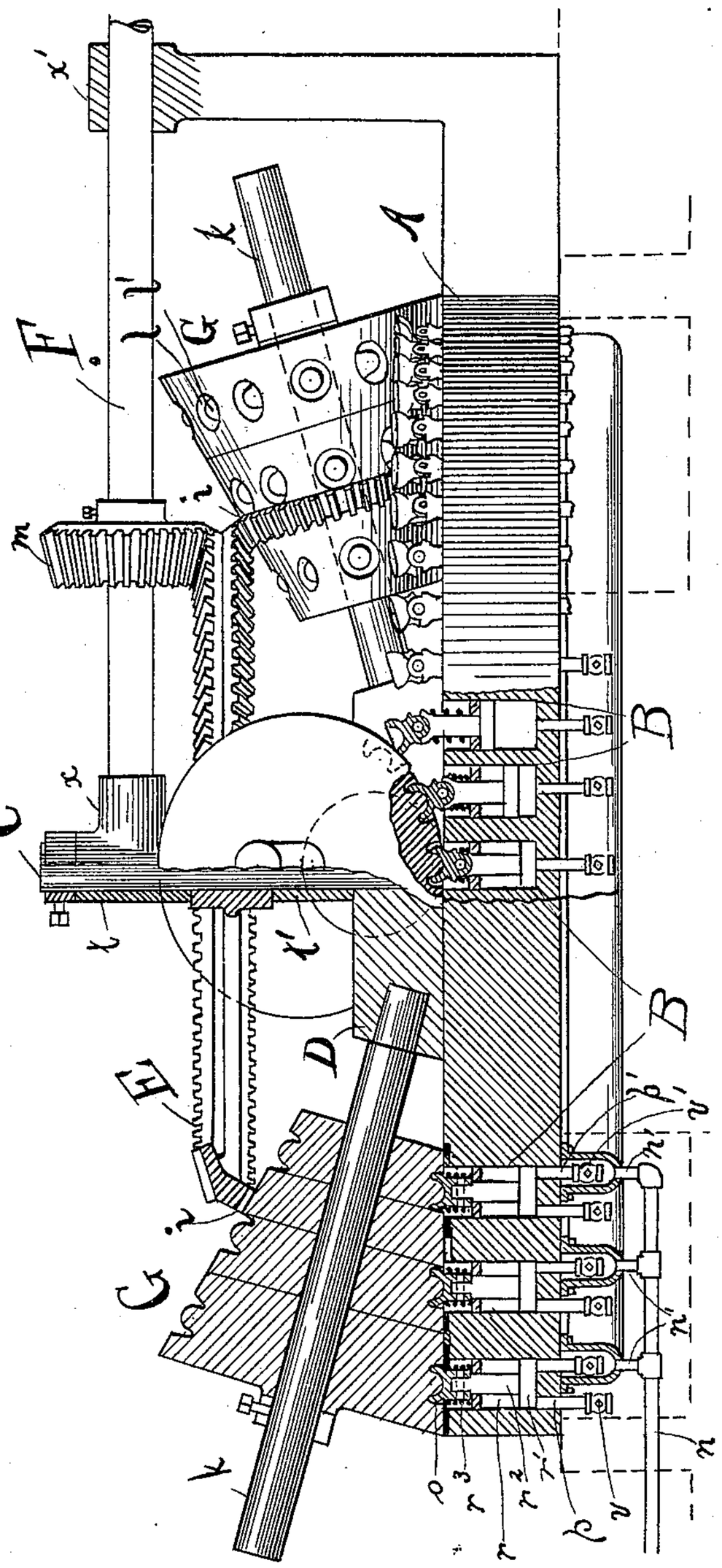
Fig 2.



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MACHINE FOR GENERATING FLUID PRESSURE POWER.

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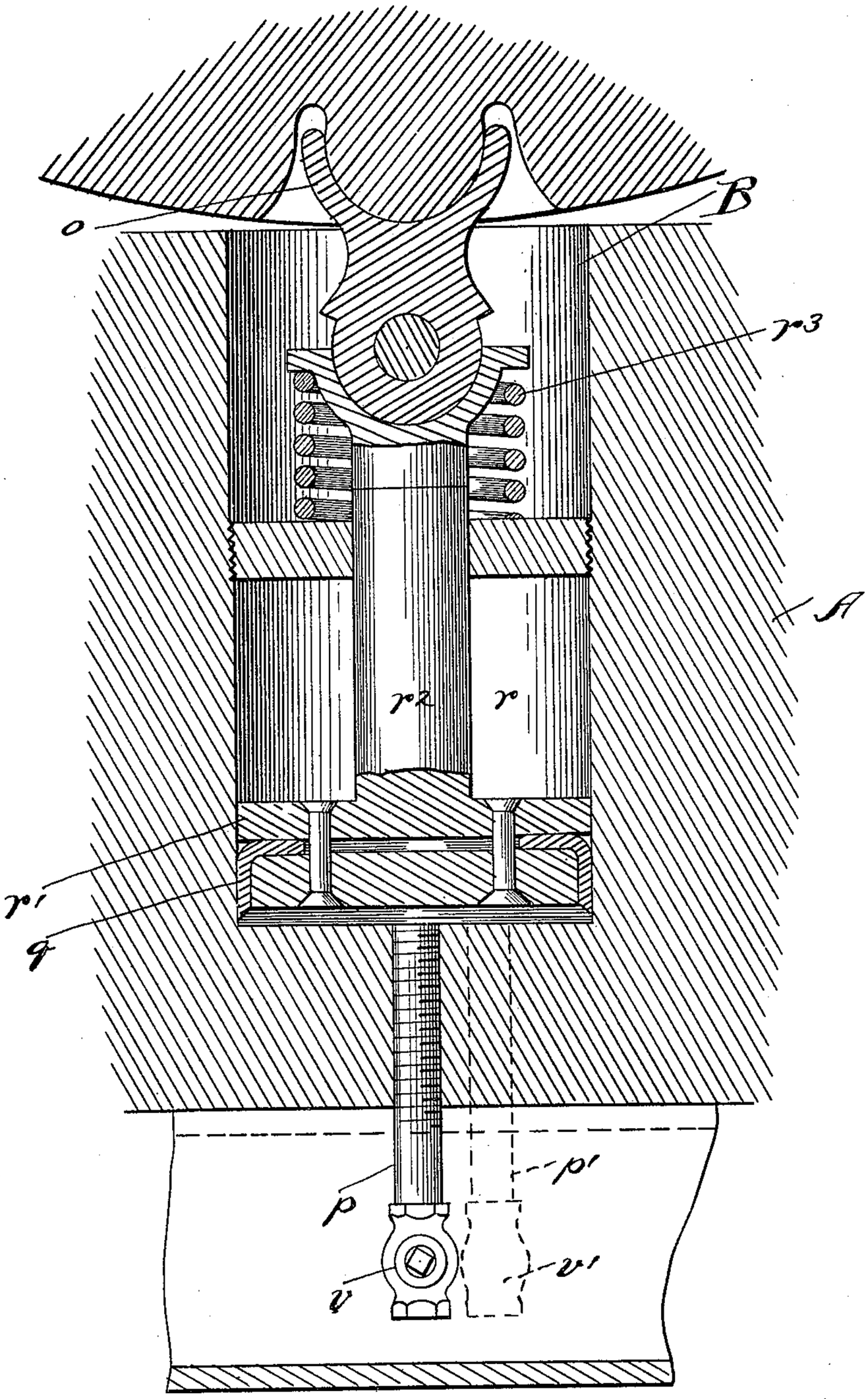
Fig. 3.



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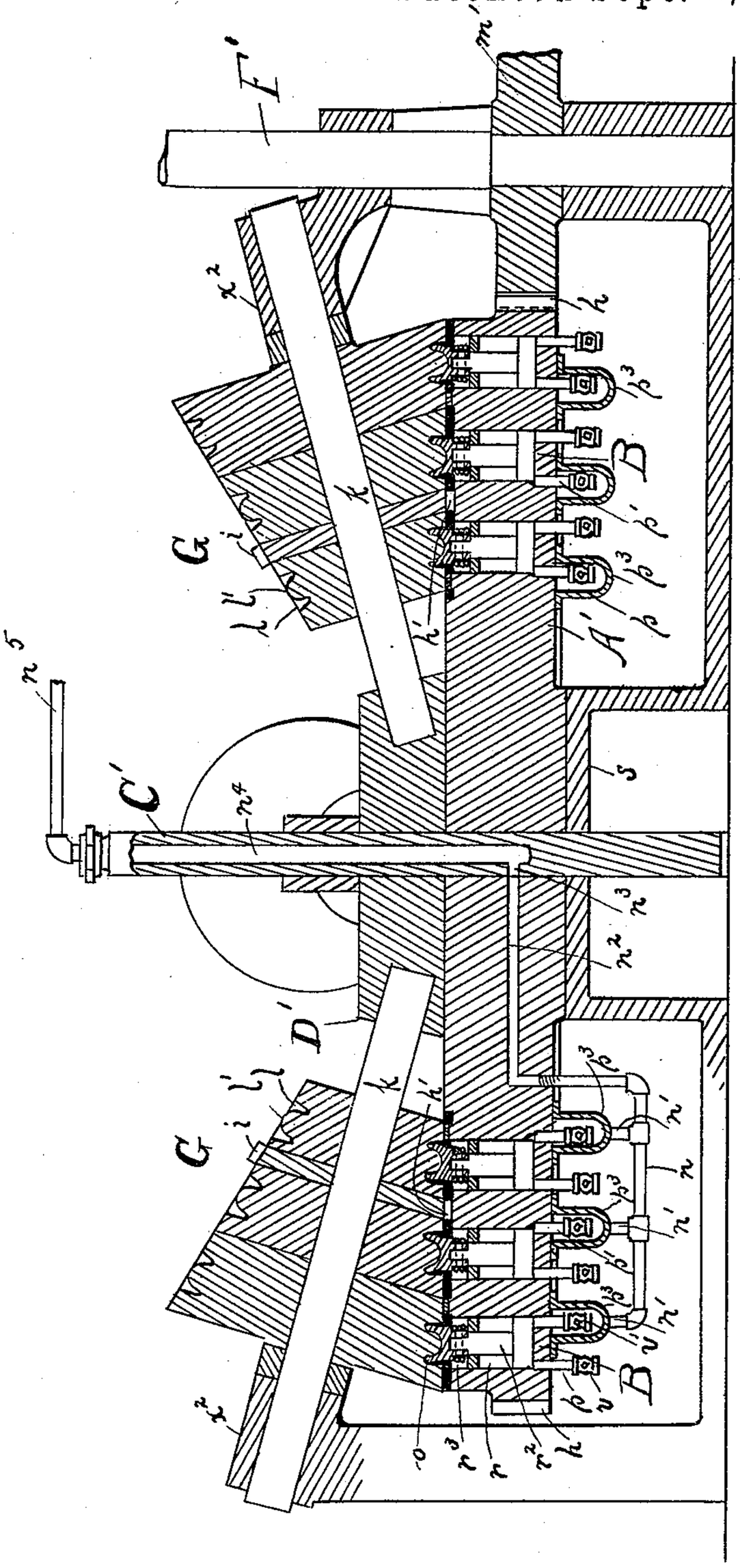
I. T. DYER.

MACHINE FOR GENERATING FLUID PRESSURE POWER.

No. 566,897. Patented Sept. 1, 1896.

Fig 4.



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UNITED STATES PATENT OFFICE.

ISAAC T. DYER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO RICARD O'SULLIVAN BURKE, OF SAME PLACE.

MACHINE FOR GENERATING FLUID-PRESSURE POWER.

SPECIFICATION forming part of Letters Patent No. 566,897, dated September 1, 1896.

Application filed October 14, 1895. Serial No. 565,622. (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 Machines for Generating Fluid-Pressure Power, of which the following is a specification.

My invention relates to an improvement in the class of mechanism for compressing fluid (as air, steam, and the like) for use as power by employing the action upon the reciprocating pistons of a series of fluid-pumps of a rolling body to actuate the pumps.

Referring to the accompanying drawings, Figure 1 is a plan view of my improved machine with the ends of the several shafts thereof shown broken away. Fig. 2 shows the same by a broken view in elevation, partly sectional. Fig. 3 is a broken view showing one of the pumps, on an enlarged scale, in sectional elevation; and Fig. 4, a view of the machine in vertical sectional elevation, showing a modification.

A is the bed of the machine, shown in its preferred circular shape, and which should be formed, massively, of metal. According to the construction represented by Figs. 1 and 2 the bed is stationary. At suitable intervals cylindrical wells are formed in the bed to a desired depth from its upper surface to afford the cylinders r of air-pumps B, each cylinder containing a piston r' on a stem r^2, and depending for its outward stroke upon the recoil of a spring r^3, confined about the stem to be compressed by the inward stroke of the piston, the latter being provided with packing q, and operating, by its upstroke, to suck in atmospheric air through the inlet-pipe p, having an inwardly-opening check-valve v, and by its downstroke to force the air out through the discharge-pipe p', equipped with an outwardly-opening check-valve v'. On the outer end of the piston-stem is pivoted a yoke o. As shown, three concentric circumferential series of the pumps B are provided on the bed A, though this number may, of course, be varied according to desire or requirement; and they are placed in such relation to each other, both circumferentially and radially, (though there may be no strictly radial series of the pumps, owing to the variation in the number of members of the several concentric circumferential series,) as to coincide with the points which actuate them upon the rolling bodies, all as hereinafter described. Each circumferential series of the pipes p' is covered by a cap p^3, into which the fluid is discharged from them; and all the caps communicate, through discharge-pipes n', with a common outlet-pipe n, which leads to the point of storage or utilization (not shown) of the compressed fluid.

Extending upward from the center of the bed A is a stationary shaft or post C, Fig. 2, surrounded at its lower end, adjacent to the bed, by a rotatory head D, and above the head D the post C carries, confined between the sleeves t and t', a rotatory beveled gear-wheel E, having a separate set of teeth on each of its upper and lower sides. This gear-wheel is shown most clearly in Fig. 2. In Fig. 1 of the drawings only a portion of the teeth on the upper side of the wheel are shown, the remainder being indicated by broken lines to avoid confusion in the drawings.

F is a rotary drive-shaft supported at one end in a suitable bearing x, provided on the post C, and, toward its opposite end, in a bearing x', and it carries a beveled pinion m, meshing with the teeth on the upper side of the beveled gear-wheel E.

G G are rollers, of which four are shown, (although it is within my invention to provide one or more,) preferably of the tapering shape illustrated, and formed of heavy material, such as iron or stone, to weigh each, say, a ton or more. Each roller is provided with series of recesses l, containing projections l', corresponding in relative location with the protruding yokes o of the pump-pistons, which these projections encounter in the path of travel of the rollers, as hereinafter described. Each tapering roller rests, to extend radially, upon the upper surface of the bed A and bear its weight against the corresponding series of yokes o, that may be beneath it, the roller being connected with the rotatory head D by a shaft k, passing lengthwise through the center of the roller (which revolves with the shaft) and jour-

naled at its inner end in a suitable bearing provided in the rotatory head. On each roller is a circumferential beveled gear *i*, with which mesh the teeth on the lower side of the beveled gear-wheel E. As in the case of the wheel E in Fig. 1, to avoid confusion in that figure of the drawings the beveled gears *i* are merely indicated by broken lines on all the rollers except one.

The operation of the machine involving the construction illustrated in Figs. 1 and 2 is as follows: The driving power (not shown, but which may be any suitable engine) applied to the shaft F rotates it and, through its gear connection with the rollers G, turns them on their own axes, and also about the post C with the rotatory head D. In rolling the bodies G the projections *l'* on each execute, as it were, a step-by-step motion, encountering in each step a series of the yokes *o* on the protruding ends of the pump-piston stems, and, by the weight of the rolling body, producing inward strokes of the encountered pistons and compression of their controlling-springs r^3 and forcing the air which the pistons have sucked into the cylinders by their upward strokes, produced by the recoil of the springs r^3, when released, out through the pipes *p'* into the common discharge-pipe *n*. Of course, if steam or other fluid be the fluid to be compressed or pumped, the pipes *p* are suitably connected with the supply thereof, as with an exhaust-steam supply. The number of times each rolling body may be caused to travel the circuit of the bed A in one minute is easily ten, so that then, with four of these bodies provided, each pump will be actuated forty times per minute, and with, say, eighty pumps, each thus actuated forty times, the air-pressure produced in each minute of the operation of the machine is the result of three thousand two hundred piston-strokes. Instead of causing the rolling bodies G to travel the circuit of the bed, a bed A', carrying the pumps, may, with the same result as that described, be caused to rotate below those bodies and roll them only on their own axes. This may be accomplished by the construction illustrated in Fig. 4. For this purpose a stationary head D' may be provided about the rotatory post C' to afford bearings for the inner ends of the rotary shafts *k*, carrying the bodies G, these shafts being supported at their outer ends in suitable bearings x^2. The bed A' is supported at *s* to be rotated with the shaft C', and is provided with gear-teeth *h* about its periphery, meshing with a horizontally-disposed pinion *m'* on a vertical drive-shaft F' and with gear-teeth *h'* about its upper surface, with which mesh the gears *i* on the rollers; and the leading-off pipe *n* has a tubular extension n^2, formed in the bed A' and coinciding at its end with a port n^3, leading to a longitudinal passage n^4 in the post C', from the outer end of which extends a pipe n^5 for conveying the generated pressure or pumped fluid to the point of storage or of its utilization. The connection between the pipe n^5 and the passage n^4 should be an ordinary rotary union connection. As will be seen, however, the principle of the machine is the same whichever of the two constructions be employed.

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

1. In a machine for generating fluid-pressure power and pumping fluid, the combination of a bed, fluid-pumps provided in circumferential series on said bed and having their piston-stems projecting into a circumferential path on the surface of the bed, one or more shafts *k*, each supported to incline downward toward the central portion of the bed, a tapering roller G supported on each shaft to bear on the bed and successively engage the stems in said path by the advancing movement, one with relation to the other, of the bed and roller or rollers, and driving means for producing said movement, substantially as described.

2. In a machine for generating fluid-pressure power and pumping fluid, the combination of a bed, fluid-pumps provided in circumferential series on said bed and having their piston-stems provided with pivotal yokes projecting into a circumferential path on said bed, one or more tapering traveling rollers G each rotatably supported on a shaft *k* journaled to incline downward toward the center of the bed, and each provided with series of projections to engage the yokes in said path, and driving means for rotating said rollers and rolling them about said path, substantially as described.

3. In a machine for generating fluid-pressure power and pumping fluid, the combination of a stationary bed A, fluid-pumps provided in circumferential series on said bed and having their piston-stems projecting into a circumferential path on the upper surface of the bed, a post C extending from the bed and carrying a rotary gear-wheel E, a rotary head D surrounding the post, tapering rollers G supported on the bed and having shafts *k* journaled in said head and carrying circumferential gears *i* in mesh with said gear-wheel, and a drive-shaft F carrying a pinion *m* meshing with said gear-wheel to rotate said rollers and roll them about said path, substantially as and for the purpose set forth.

4. A machine for generating fluid-pressure power and pumping fluid, comprising, in combination, a bed A, fluid-pumps B provided in concentric circumferential series on the bed and each composed of a cylinder *r* containing a piston *r'* having a stem r^2 terminating in a pivotal yoke *o* projecting into a circumferential path on the upper surface of the bed, and a spring r^3 confined about said stem, valve-controlled inlet-pipes *p* leading into the pump-cylinders and valve-controlled discharge-pipes *p'* leading therefrom to a common discharge-pipe, a post C extending from the bed and carrying a rotary gear-

wheel E, a rotary head D surrounding the post, tapering rollers G having series of recesses *l* containing projections *l'* and supported on the bed and having shafts *k* journaled in said head and carrying circumferential gears *i* in mesh with said gear-wheel, and a drive-shaft F carrying a pinion *m* meshing with said gear-wheel to rotate said rollers and rotate them about said path, substantially as and for the purpose set forth.

ISAAC T. DYER.

In presence of—
M. J. FROST,
J. H. LEE.