(No Model.)

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K. MOSCICKI.

ENGINE.

No. 523,128. Patented July 17, 1894.

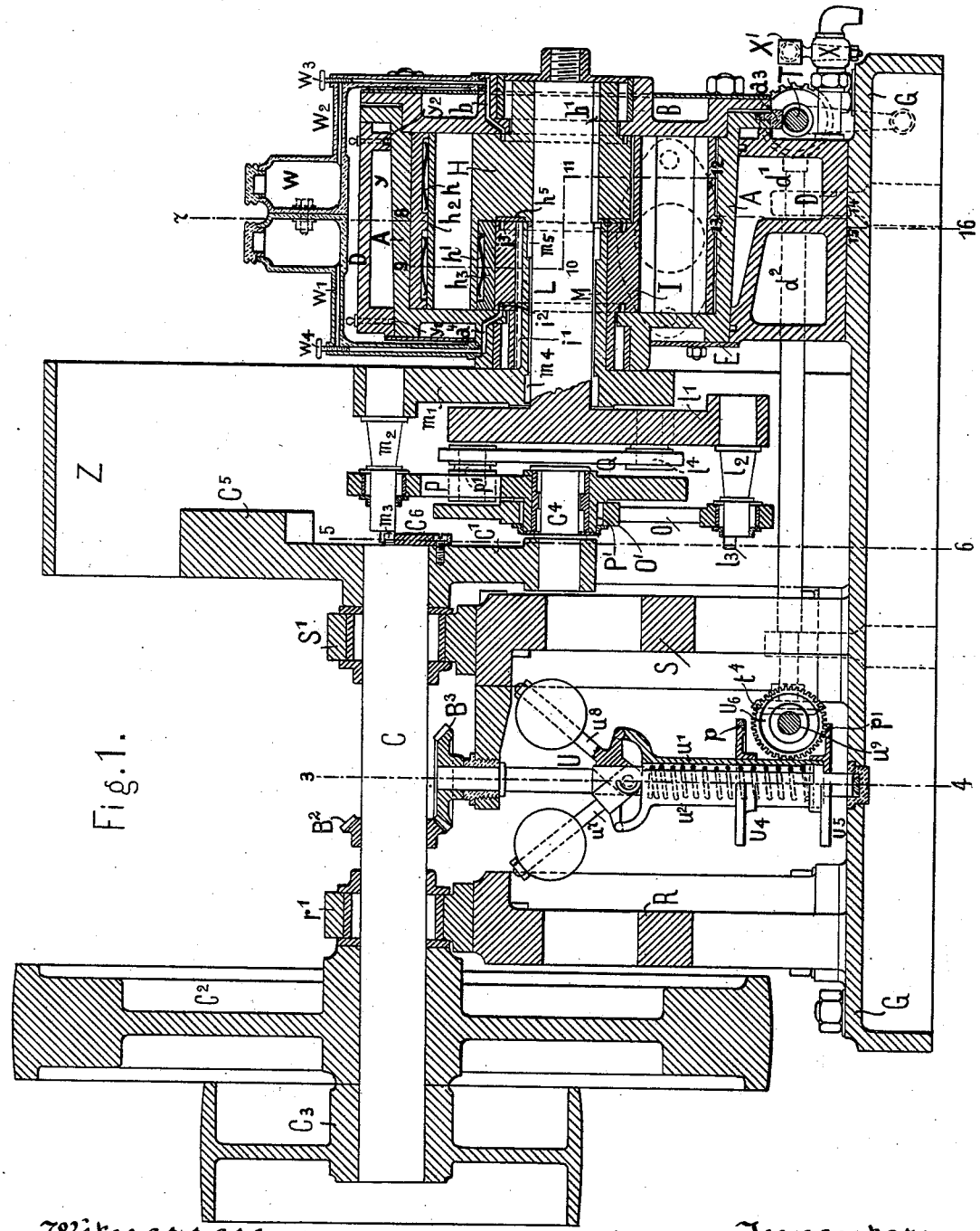

Fig. 1.

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(No Model.) 8 Sheets—Sheet 2.

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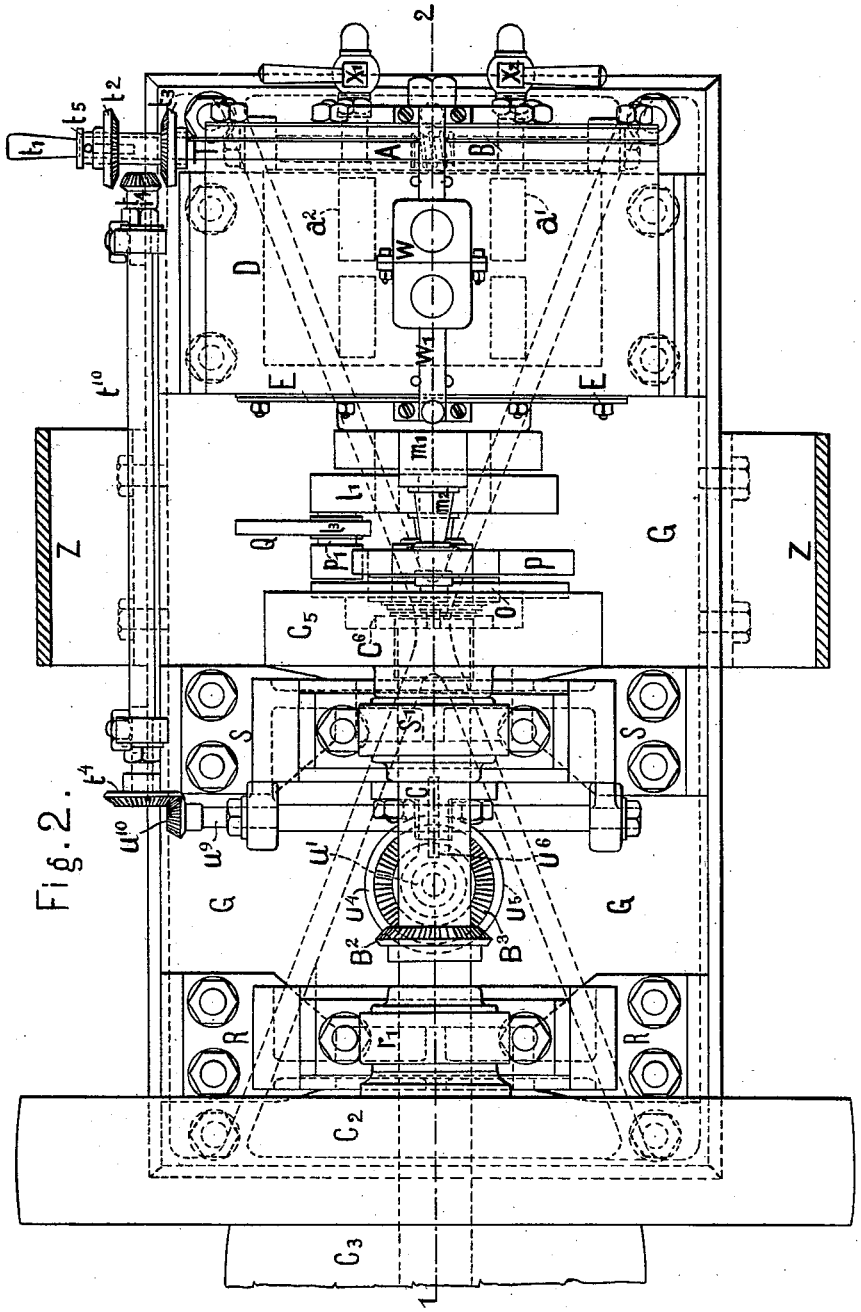

Fig. 2.

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Fig. 3.

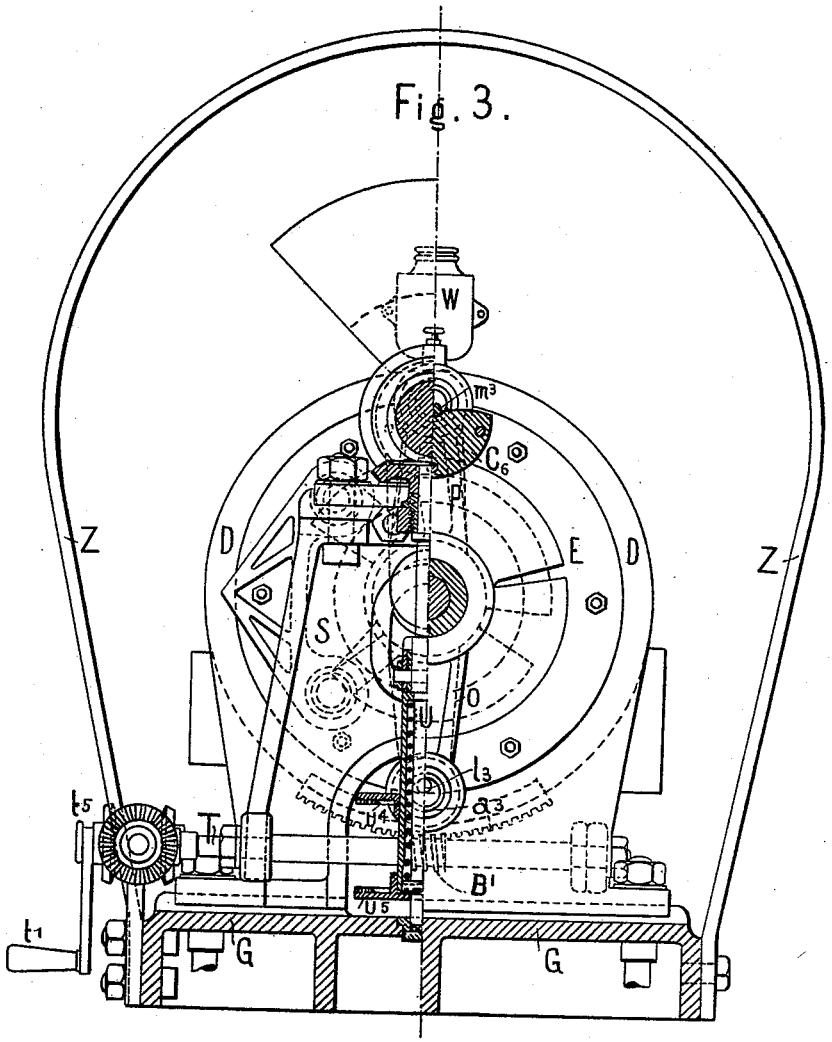

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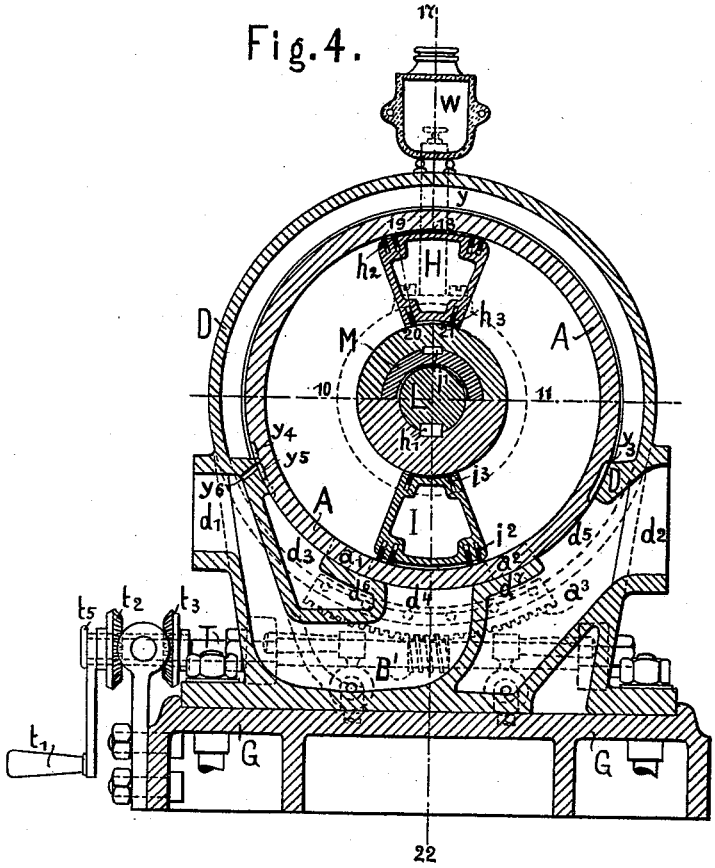
Fig. 4.



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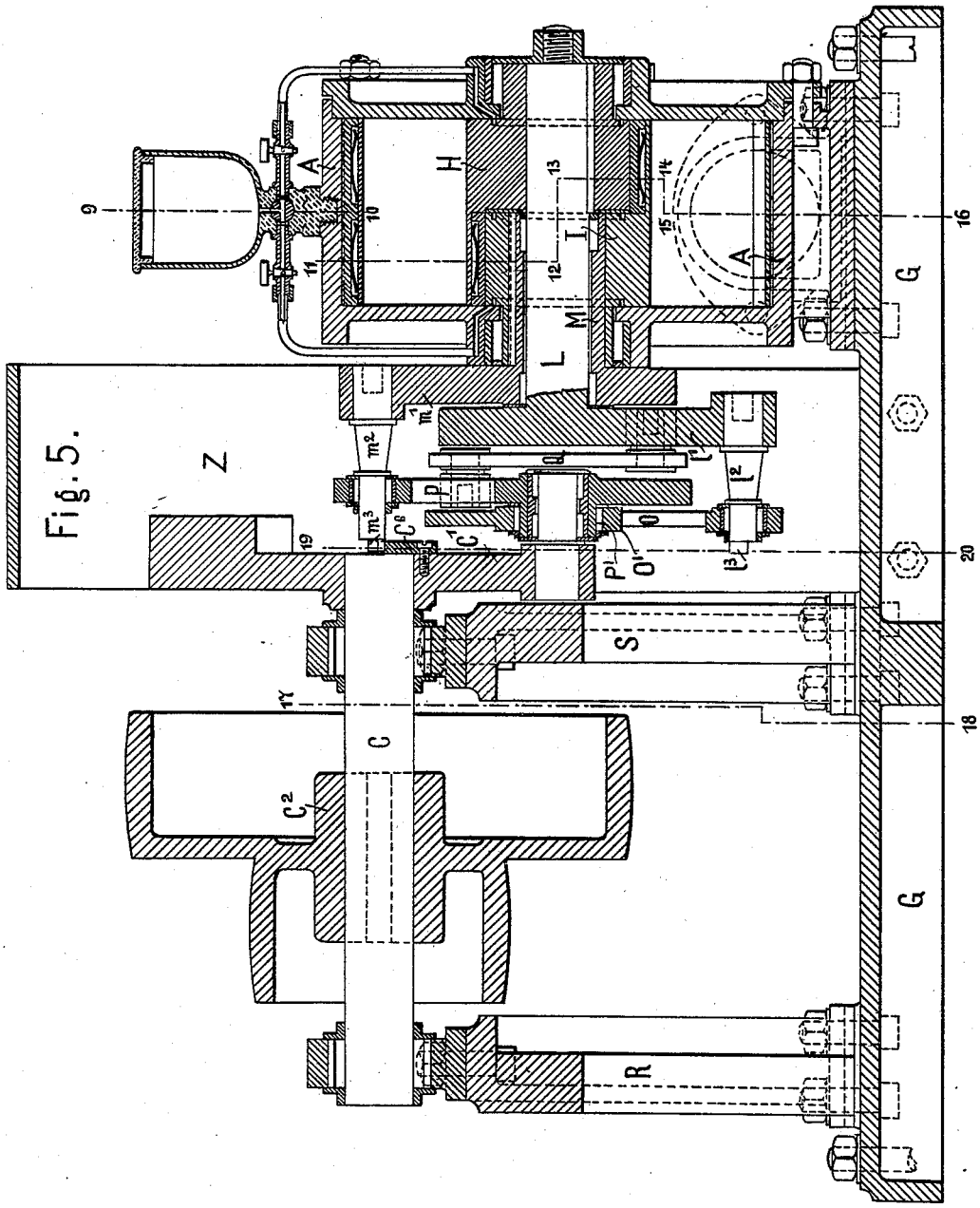

Fig. 5.

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Fig. 6.

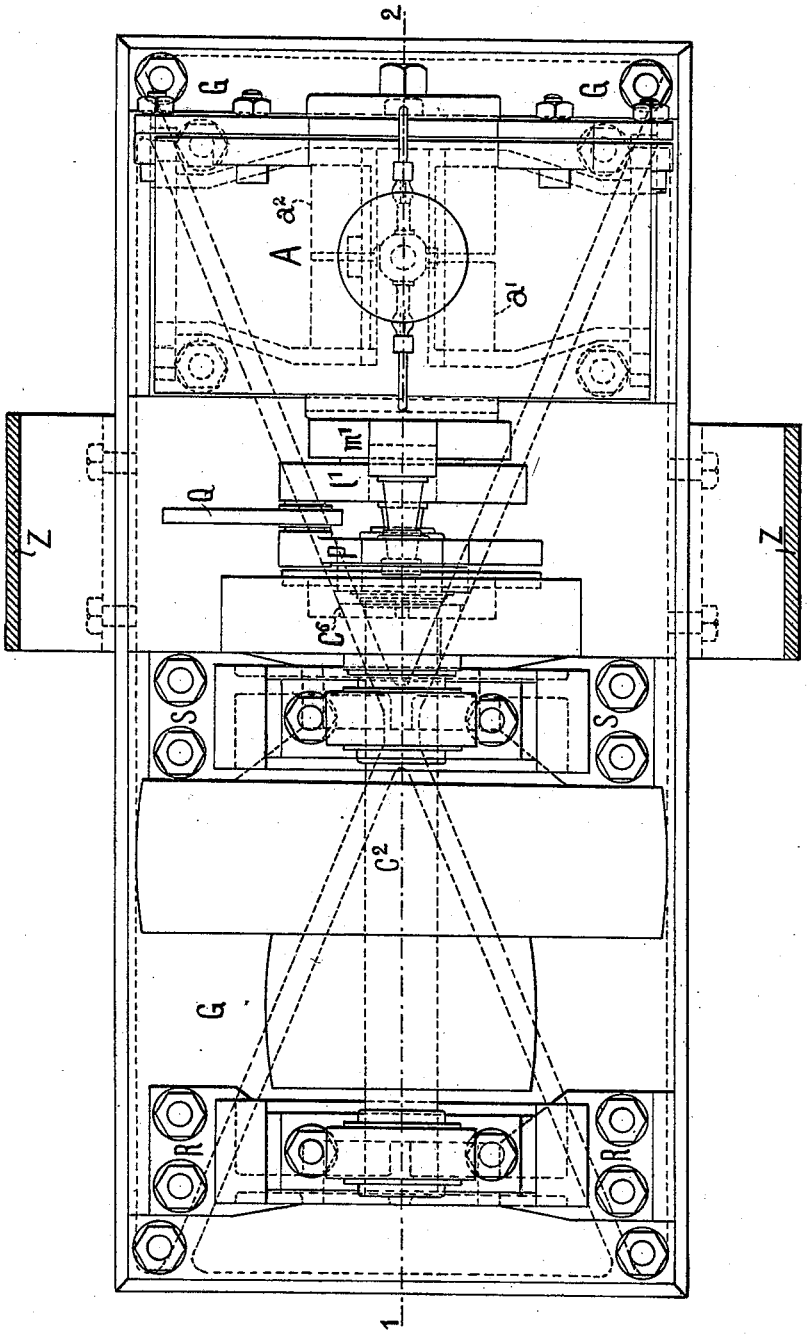

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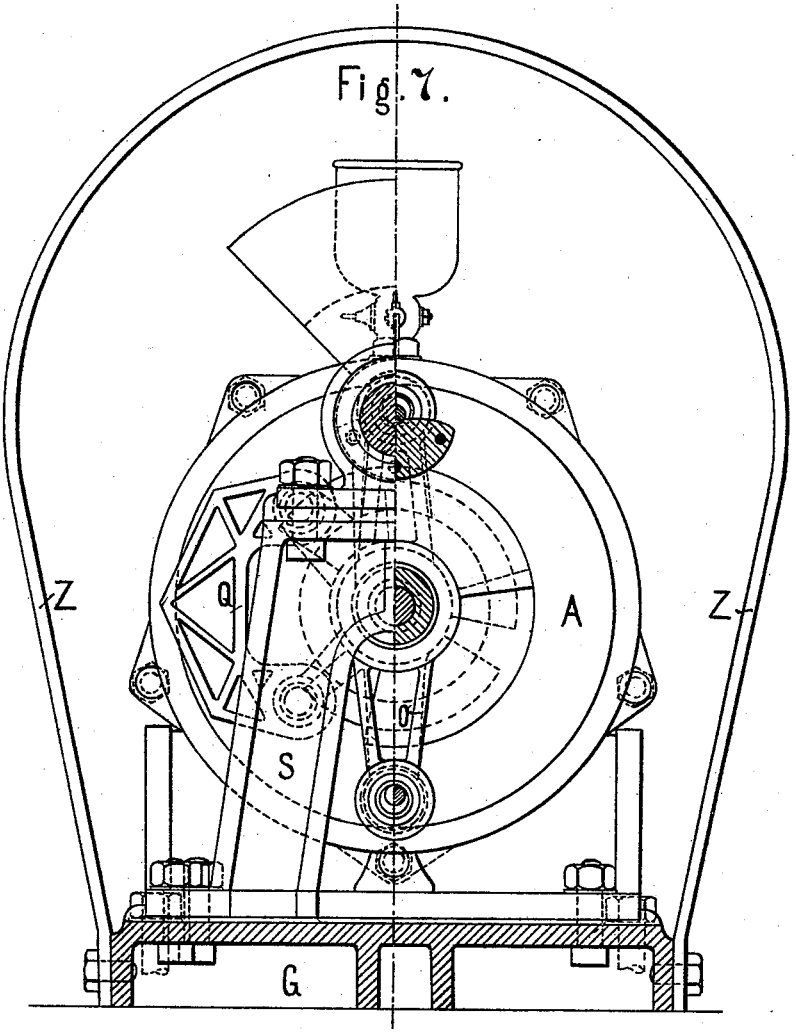
Fig. 7.



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8 Sheets—Sheet 8.

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ENGINE.

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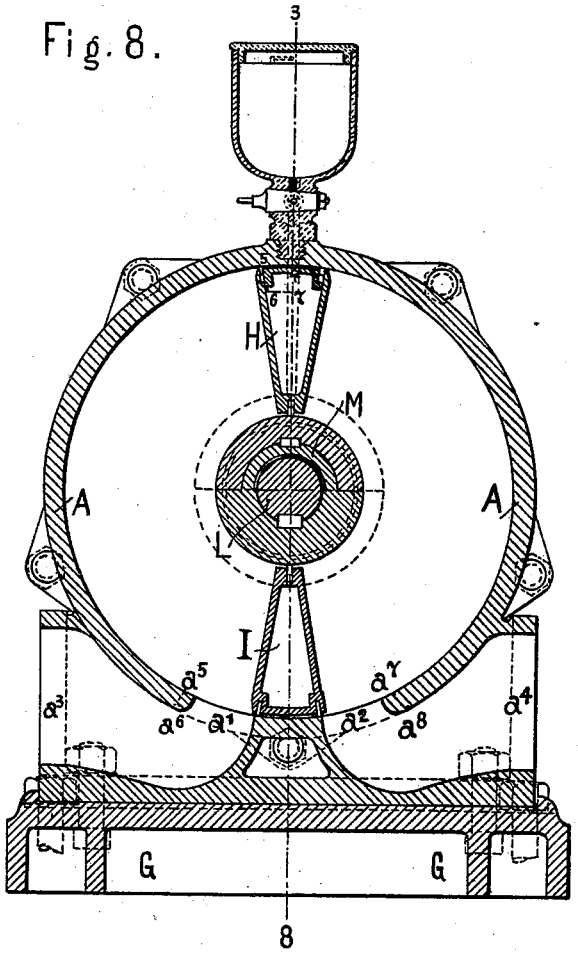
Fig. 8.



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UNITED STATES PATENT OFFICE.

KAJETAN MOSCICKI, OF WARSAW, RUSSIA.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 523,128, dated July 17, 1894.

Application filed September 25, 1893. Serial No. 486,406. (No model.)

To all whom it may concern:

Be it known that I, KAJETAN MOSCICKI, a subject of the Czar of Russia, and a resident of Warsaw, Russia, have invented certain new and useful Improvements in Engines, of which the following is a specification.

My invention has relation in general to steam or other fluid engines; and it relates more particularly to the general construction and arrangement of the engine adapted to different uses or purposes.

The principal objects of my invention are first, to provide a comparatively simple, durable and effective steam or elastic fluid engine; second, to provide a rotary engine for pumping and other purposes so constructed and arranged as that positive movement and effective action of the parts thereof are insured and the engine so constructed and arranged as that the same has but a single dead center point and the piston adapted to be operated so that a single revolution of the same effects a double revolution of the crank of the engine; third, to provide a rotary engine having a steady and uniform action or movement; fourth, to provide an engine so constructed and arranged as that each piston is adapted to alternately control the influx and efflux of steam or other fluid and to act as a working member of the engine; fifth, to provide an engine having two pistons so arranged for operation as to move alternately for controlling the actions thereof; sixth, to provide an engine with a fixed cylinder and with two pistons alternately actuated and having but a single dead center point; seventh, to provide an engine having a movable cylinder and two pistons alternately actuated and arranged so as to be afforded two different rates of speed for respectively serving as the working member of the engine and for permitting of the entrance and exit of the elastic fluid to and from the cylinder of the engine; eighth, to provide an engine having two pistons with a single dead center point and the pistons thereof arranged for operation so as to be afforded different rates of speed in the respective movements thereof; and ninth, to provide an engine in which the effective action and speed thereof are appreciably enhanced, thereby adapting the engine to many different uses or purposes.

My invention consists of the improvements in engines constructed, arranged and adapted for operation in substantially the manner hereinafter described and claimed.

The nature and general features of my invention will be more fully understood from the following description taken in connection with the accompanying drawings forming part hereof; and in which—

Figure 1, is a longitudinal section of an engine embodying features of my invention. Fig. 2, is a top or plan view of the engine illustrated in Fig. 1. Fig. 3, is a cross-sectional view of the same on the lines 3—4 and 5—6 of Fig. 1. Fig. 4, is a similar view on the line 7—16, of Fig. 1. Fig. 5, is a longitudinal central section of a rotary pumping engine in a modified form, embodying features of my invention. Fig. 6, is a top or plan view of the pumping engine of Fig. 5. Fig. 7, is a cross sectional view of the pumping engine on the lines 17—18 and 19—20 of Fig. 5; and Fig. 8, is a similar view on the line 9—16, of Fig. 5.

Referring to the accompanying drawings with special reference to Figs. 1 to 4, which illustrate an engine having two pistons H and I, connected respectively with concentric axles L and M. These axles projecting through the inclosing cylinder A, on the left hand side, have respectively fitted to or formed integral with them cranks l' and m'. The crank m', has a pin m^2, and the crank l', has a corresponding pin l^2. These pins are respectively inserted through bearings provided in lever-arms or connecting rods O and P, having bosses O′ and P′, which are concentrically mounted on the pin or stud C^4, which projects from the counter-weighted crank C′, carried by the shaft C.

C^5, is a counter-weight of the crank C′.

The shaft C, is mounted in bearings r' and S′, provided in the top of the pedestals or standards R and S, and this shaft carries a fly-wheel C^2, and a pulley C^3, for the reception of a belt, not shown, whereby motion may be communicated to a machine for effecting the actuation thereof. The crank l', is connected to the lever-arm or connecting-rod P, by means of the pivots or stud-pins p' and l^4, and the belt Q.

Fixed to the counter-weighted crank C′, is

a cam C^6, as illustrated in Figs. 1, 2, 5, 6 and 7, for maintaining the small eccentrically arranged pins l^3 and m^3, of the crank arms l^2 and m^2, alternately in engagement with the peripheral surface of the cam in the rotation of the shaft C, and therewith of the counterweighted crank C', as fully shown in Figs. 3 and 7. These pins l^3 and m^3, may be as small as possible, for the reason that they are employed merely to prevent accidental displacement or dislocation of the arms l^2 and m^2, for the reason that they are alternately in engagement with portions of the cam C^6, in the rotation of the cranks l' and m', in connection with the connecting rods O and P.

The bulk of the single moving parts of the engine are so arranged as that the mechanism thereof is maintained continuously in equilibrium. The outward formation of the cylinder A, as illustrated in Figs. 1 to 4, is in the form of a truncated cone, and the same fits snugly into a casing D, which is bolted to the foundation or platform G, as illustrated in Figs. 1 and 5. The cylinder A, is provided with two ports a' and a^2, as shown in dotted lines in Fig. 4, and they are placed close to one another. In the casing D, are provided three ports d^3, d^4 and d^5, of which the two outer ports d^3 and d^5, communicate with each other and the outlet or exhaust pipe d^2, while the center port d^4, is in direct communication with the fluid supply pipe d'.

The pistons H and I, are arranged so as to snugly fit the internal surface of the cylinder A, by means of metallic strips h^2 and i^2, caused to bear firmly against the surface of the cylinder A, by means of springs h and h'. These pistons where they bear against one another are likewise fitted with packing strips h^3 and i^3. The cylinder A, can be turned round its axis so as to regulate the cut off, and the direction of rotation of the engine, that is, if the cylinder is turned sufficiently to bring the port a^2, as illustrated in Fig. 4, into communication with the exhaust port d^5, while the port a', is in communication with the supply port d^4, the direction of rotation will be reversed, that is, assuming that the ports a' and a^2, were respectively in their former positions in communication with the ports d^3 and d^4.

If it is required to reverse the engine, the cylinder A, will be turned by means of the hand-crank t', mounted on the shaft T, which is provided with a worm B', meshing with a toothed segment a^3, as illustrated in dotted lines in Figs. 3 and 4, and connected with the cylinder A. When the crank t', is turned, the worm B', meshes with the segment a^3, and revolves the cylinder A. The range of movement through which the cylinder must be turned to regulate the cut off is controlled by means of a governor U, as illustrated in Fig. 1. This governor U, is driven from the main shaft C, by means of the bevel-wheels B^2 and B^3, having on its casing u^2, two plates or disks u^4 and u^5, revolving along with it. These plates or disks have spirally cut teeth p and p', facing one another, and into one or the other of these teeth the cog-wheel U^6 meshes, according as the casing u^2, rises or falls in the movement of the engine.

u', is a spring and u^7 and u^8, are arms carrying centrifugal balls.

The spiral teeth are of opposite action, that is to say, one spiral is arranged to run from the center of the disk toward the circumference, while the other spiral runs from the circumference toward the center. When the speed of the engine increases, the casing u^2, descends and as a consequence the disk or plate u^4, comes in contact with the cog-wheel U^6, thereby revolving the same and the cross-shaft u^9, and the bevel-wheel u^{10}, on this shaft actuates the bevel-wheel t^4, turning the shaft t^{10}, and the bevel-wheel t^{14}, as illustrated in Fig. 2, which in turn actuates either the bevel-wheel t^2 or t^3, when in gear, and revolves through the same the shaft T and also the cylinder A. When the speed of the engine is decreased, the casing u^2, rises and the disk or plate u^5, actuates the cog-wheel U^6, and its connected mechanism, so as to again revolve the cylinder A.

When the reversal of the engine has been accomplished by means of the hand-crank t', as hereinbefore described, the governing mechanism must be thrown out of gear by the disengagement of the cog-wheel U^6, from the teeth of the plate or disk u^5, through the fall of the weighted arms u^7 and u^8, and therewith the casing u^2, and so that the cog-wheel will be out of engagement with both of the said toothed plates or disks. As will be observed a space is left between the cylinder A, and its casing D, and which space serves as a steam jacket. Steam is admitted to the space from the port d', through the passages y^4, y^5 and y^6, and the water of condensation is conducted through the passages y^3, on the opposite side, into the exhaust of the engine.

The engine is provided with a lubricating appliance or apparatus W, from which when filled with oil it flows by means of the pipe connections W' and W^2, controlled by valves W^3 and W^4, to the pistons H and I, for effecting the continual lubrication thereof. X, are drain cocks provided with handles X' and X^2. Z, is a protector or guard for the engine.

The pumping engine illustrated in Figs. 5 to 8 inclusive, differs in construction from the engine described with reference to Figs. 1 to 4, in so far that the cylinder A, in this instance, is stationary instead of movable, and the outer casing D, of Fig. 1, is dispensed with. The inlet and outlet ports a' and a^2, communicate respectively with the inlet passage a^3, and the outlet passage a^4. The cylinder A, with its passage-ways, is, in this case, bolted directly to the foundation or platform G. To prevent thuds when passing the dead center point, the ports a' and a^2, are tapered or widened out to the lines a^5, a^6, a^7 and a^8,

through which, at the moment when a direct communication is established between the passages a^3 and a^4, the liquid moves on account of its inertia, uninterruptedly.

The construction and arrangement of apparatus such as hereinbefore described is adapted for use, as a water-motor, ventilator, pump or a steam engine.

The peculiar construction of the engine and the manner in which the parts thereof are connected together are such, that while the direction of rotation of the pistons H and I, is always the same, yet at different periods in their revolutions, they travel at different rates of speed, that is to say, at one period of time, the piston H, will travel at a quicker rate of speed than the piston I, and at another period of time, the piston I, will travel at a greater rate of speed than the piston H. The piston which for the time being is traveling at a quick rate of speed acts on the crank pin C^4, of the shaft C, while the piston, which for the time being is traveling at a slow rate of speed controls the entrance and exit of the elastic fluid to and from the cylinder A by the opening and closing of the ports at the proper time to and from the cylinder A. After the quick traveling piston has completed one revolution, it exchanges or assumes the functions of the slow piston, and vice versa.

It will be manifestly obvious that as to minor details of construction and arrangement, modifications may be made without departing from the spirit of my invention; and hence I do not wish to be understood as limiting myself to the precise construction and arrangement illustrated and explained.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An engine provided with a movable cylinder, two pistons connected with concentric axles having cranks provided with pins held in the bearings of connecting rods having bosses concentrically mounted on a pin or stud projecting from a weighted crank supported to position on a shaft carrying a fly wheel and pulley, one of said cranks and connecting rods provided with pins engaged by a belt or link, and a cam secured to said counter-weighted crank and engaged by certain of the pins of said cranks, substantially as and for the purposes set forth.

2. An engine provided with a movable cylinder, having two pistons connected with concentrically arranged axles, whereof one of the pistons controls the movement of the crank-pin of a fly-wheel shaft and whereof the other controls the influx and efflux of elastic fluid to and from said cylinder, substantially as and for the purposes set forth.

3. An engine, provided with a cylinder, two pistons mounted on concentrically arranged axles provided with cranks having pins supported by connecting rods provided with bosses concentrically disposed with respect to each other on a pin or stud, a shaft provided with a fly-wheel and pulley, a weighted crank and a cam connected therewith and adapted to be engaged by the pins of said cranks, substantially as and for the purposes set forth.

4. An engine provided with a cylinder and means for turning the same on its axis for effecting the reversal of the engine, substantially as and for the purposes set forth.

5. An engine provided with an inclosed revoluble cylinder, two pistons concentrically mounted on axles provided with cranks having pins held in the bearings of connecting rods provided with bosses concentrically arranged with respect to each other on a pin or stud, one of said connecting rods connected by means of a strap or belt with one of said cranks, a shaft provided with a counter-weighted crank having a cam and a fly wheel and pulley mounted on said shaft, substantially as and for the purposes set forth.

6. An engine provided with a casing having automatic lubricating apparatus, a revoluble cylinder supported to position in said casing, two pistons connected with two nested axles having concentrically arranged cranks provided with pins supporting connecting means mounted on a pin or stud, and a fly-wheel shaft carrying a counter-balanced crank and a cam adapted to alternately engage the pins of said cranks, substantially as and for the purposes set forth.

7. An engine provided with a cylinder adapted to be turned on its axis, means for effecting such movement, two pistons concentrically connected with axles carrying cranks with pins, connecting means engaging with said pins, a fly-wheel-shaft for controlling the movement of a governor mechanism, and means for reversing the movement of the engine, substantially as and for the purposes set forth.

8. In an engine, the cylinder A, crank t', shaft T, provided with a worm B', meshing with a segment a^3, substantially as and for the purposes set forth.

9. In an engine, a cylinder adapted to be turned on its axis, a governor mechanism controlled by the main-shaft carrying fly and driving-wheels, and means, substantially as described, for controlling and reversing the same, substantially as and for the purposes set forth.

10. An engine provided with a cylinder adapted to be turned on its axis and having two pistons concentrically fixed to axles or shafts and arranged so as to be actuated at two different rates of speed for controlling the working of the engine, a fly-wheel shaft and a governor mechanism actuated thereby, and means for reversing the action thereof, substantially as and for the purposes set forth.

11. An engine provided with a cylinder adapted to be revolved within a casing and having two pistons concentrically connected with axles or shafts carrying cranks with pins

supporting interposed connecting devices, a shaft carrying fly and driving-wheels, a counter-balanced crank and a cam, a governor mechanism and means adapted to engage and disengage the same, substantially as and for the purposes set forth.

12. An engine provided with a cylinder having an automatic lubricating device connected therewith, two pistons connected with concentric axles or shafts provided with integral cranks having pins supporting interposed connecting means concentrically mounted on a pin or stud, a counter-balanced crank with a cam, and said crank mounted on the main driving shaft provided with fly and driving wheels and said cam alternately engaged by the pins of said cranks, substantially as and for the purposes set forth.

13. In an engine having a cylinder provided with two pistons with interposed bearing or packing strips and connected with concentrically arranged axles or shafts carrying cranks provided with pins for the reception of interposed connecting devices, a main driving-shaft having a counter-balanced crank mounted thereon and provided with a cam, substantially as and for the purposes set forth.

14. In an engine, the combination of the cylinder A, pistons H and I, concentric axles l and m, cranks l' and m', arms or rods O and P, pins l^4 and p', and link Q, substantially as and for the purposes set forth.

15. An engine provided with cranks l' and m', arms l^2 and m^2, concentric pins l^3 and m^3, cam C^6, and means for moving the same substantially as and for the purposes set forth.

16. An engine provided with a movable cylinder having two pistons with concentrically arranged axles or shafts adapted to be alternately operated at two different rates of speed for respectively controlling the crank pin of the main driving shaft provided with a fly-wheel and pulley, and the influx and efflux of fluid to and from said cylinder, and said shaft controlling the actuation of a governor mechanism, substantially as and for the purposes set forth.

17. An engine having a movable cylinder in the form of a truncated cone fitting a casing provided with a base-plate, said cylinder provided with two ports located in proximity to each other and said casing provided with three ports arranged so that two of them communicate with each other and the exhaust of the engine and the other with the fluid supply port thereof, in combination with two concentric pistons provided with axles having cranks pivotally connected with means having bosses concentrically arranged and mounted on a stud or pin, a weighted-crank mounted on a shaft carrying a fly-wheel and pulley, and a governor connected by a miter-gear mechanism with said shaft, substantially as and for the purposes set forth.

18. In an engine, the combination of the casing D, cylinder A, pistons H and I, port d', passages y^4, y^5, y^6 and y^3, substantially as and for the purposes set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

KAJETAN MOSCICKI.

Witnesses:
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