M. R. GÜTTLER.

MOTOR.

APPLICATION FILED JUNE 23, 1908.

947,061. Patented Jan. 18, 1910.

2 SHEETS—SHEET 1.

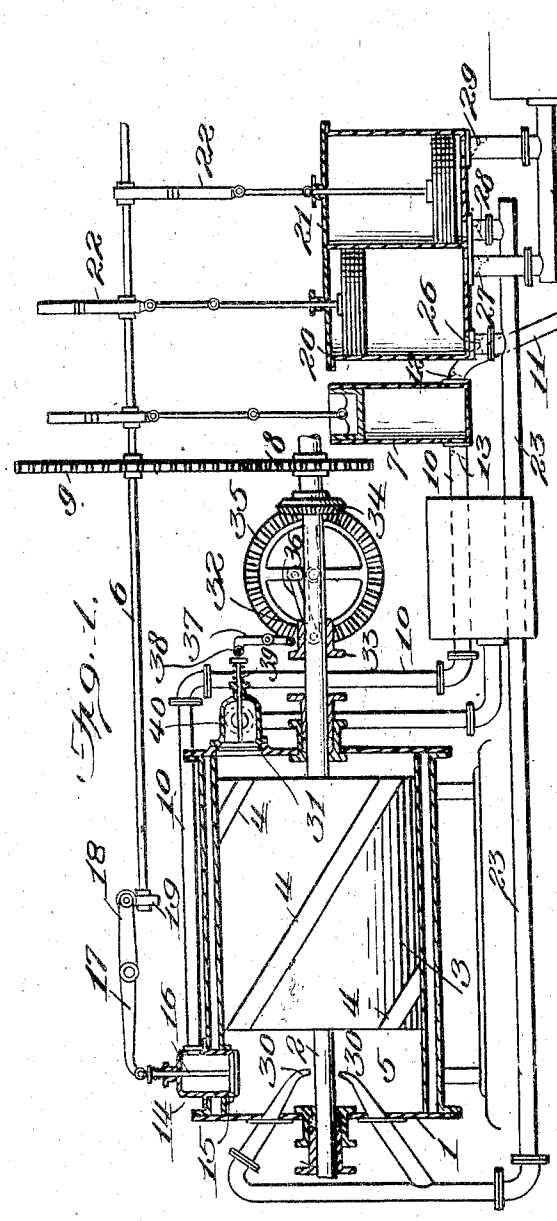

Fig. 1.

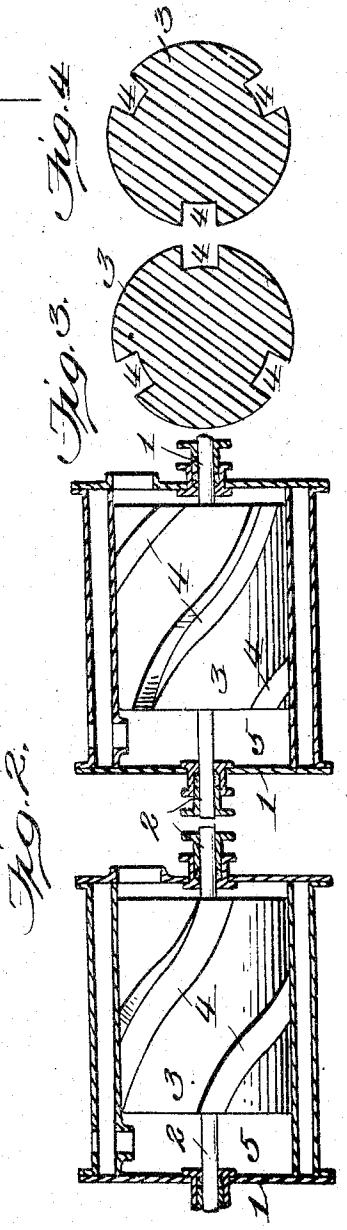

Fig. 2.

Fig. 4.

Fig. 3.

Witnesses:

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2 SHEETS—SHEET 2.

Fig. 5.

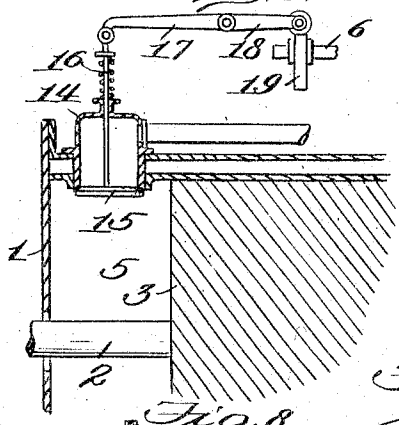


Fig. 6.

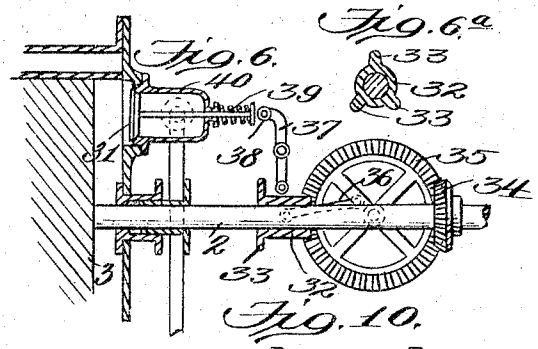


Fig. 6a.

Fig. 10.

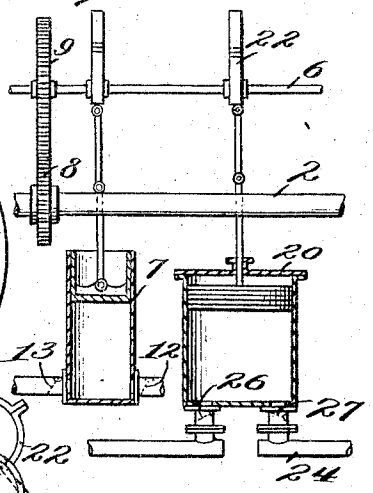


Fig. 9

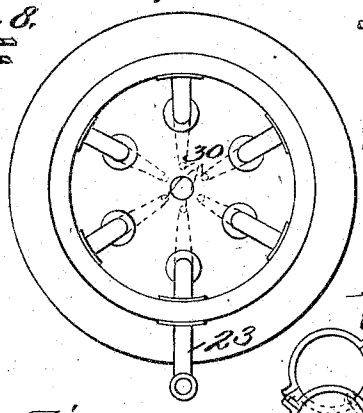


Fig. 8.

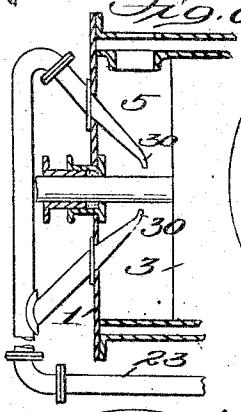


Fig. 7.

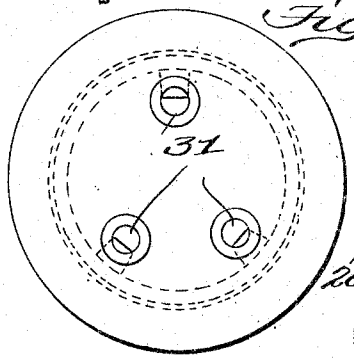
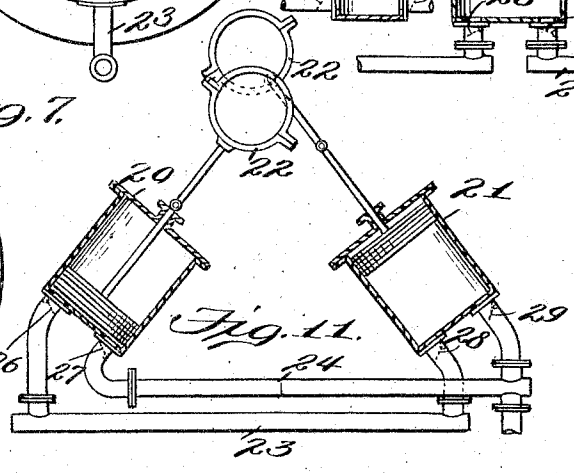


Fig. 11.



Witnesses.

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MOTOR.

947,061. Specification of Letters Patent. Patented Jan. 18, 1910.

Application filed June 23, 1908. Serial No. 440,001.

To all whom it may concern:

Be it known that I, MAX RICHARD GÜTTLER, teacher, subject of the King of Saxony, residing at Weifa, near Dresden, Saxony, Germany, have invented certain new and useful Improvements in Motors, of which the following is a specification.

The present invention relates to a motor that is driven by means of an exploded mixture of air and gas, and in connection with which a rotor or drum that rotates on its axis in a casing, is driven by the impact of the mixture that is pumped in front of one end of the drum and there is exploded and transmitted along the spiral grooves formed on the circumference of the drum and in a similar manner to that in the known turbine in which the impact acts on the oblique sides of the grooves so as to cause the piston to rotate. An explosion turbine of this kind has for many forms of working considerable advantages over motors of the reciprocating type, for example a greater number of revolutions, uniform action, the dispensing with reciprocated parts, less wear, less requirement in space and so on and by the exact calculation of the number of the grooves, the pitch thereof and the course of their curve a possibility of economy in the consumption of gas is afforded. Finally with this arrangement it is possible to employ favorable tandem combinations of the explosion turbine by arranging a number of drums of the same or of different sizes one behind the other, which if necessary may be on the same shaft and with their piston grooves arranged opposite one another in different planes.

The invention is illustrated in the accompanying drawings in which—

Figure 1 of Sheet I is a diagrammatic representation of the general arrangement in elevation with the cylinder or casing and the gas and air pumps in longitudinal section, Fig. 2 illustrates the main drum or rotor in elevation with two different forms of the grooves, Figs. 3 and 4 are cross sectional illustrations of two tandem combined drums with grooves in different relative planes. Fig. 5 on Sheet II is a longitudinal section of the cylinder explosion chamber with the valve arrangement and means for introducing the mixture of gas into the cylinder. Fig. 6 is an elevation showing the means for operating the exhaust. Fig. 6ª is a cross sectional view of the reciprocating slide piece by means of which the exhaust regulating devices are actuated. Fig. 7 is a back view of the motor cylinder with the valve plates. Fig. 8 is an elevation of the cylinder explosion chamber with the air supply pipes, Fig. 9 is an end elevation of Fig. 8 seen from the interior of the explosion chamber. Fig. 10 is an elevation of the pump arrangement with pump cylinders in longitudinal section and Fig. 11 is a side elevation of the pump driving gear.

In the motor cylinder or casing 1 a drum 3 connected with the main shaft 2 is rotatively mounted. The drum or rotor 3 is furnished with oblique or helical grooves 4 that run around the circumference thereof, and in which the mixture of air and gas introduced into the explosion chamber 5 in front of the cylinder and there exploded exercises its impact against the sides of the grooves and thereby as in water and steam turbines imparts to the drum a rotary motion in a direction corresponding to the course of the grooves 4, from the exhaust end to the explosion end of the cylinder. The mixture of air and gas is introduced into the explosion chamber in the present case by means of a pump 7 arranged on the auxiliary shaft 6. This pump is operated by two spur wheels 8 and 9 seated on the shafts 2 and 6 respectively (Fig. 10) the number of teeth on which is such that the shaft 6 runs with one half the number of revolutions of the main shaft 2, and consequently the piston of the pump 7 completes its stroke in one direction during one revolution of the shaft 2 and completes its stroke in an opposite direction during the next successive revolution of the shaft 2. The pump 7 is connected on one side with the supply pipe 10 that runs to the motor cylinder or casing and on the other side to the supply pipe 11 running from the carbureter and has two valves one of which viz., the valve 12 is arranged in the supply pipe 11 and is opened by the suction stroke of the pump, while at the same time the other valve 13 arranged in the supply pipe 10 is closed in the direction of the motor cylinder, whereas on the other hand when the piston of the pump 7 descends the valve 13 is opened in the direction of the motor cylinder while the valve 12 in

this case is closed in the direction of the carbureter so that the gas that is drawn up from the carbureter when the suction stroke of the pump is effected, passes into the supply pipe 10 when the pump piston descends and thence into a gas dome 14 (Fig. 5) arranged above the explosion chamber. In this dome the gas from the explosion chamber is further divided by the plate valve 15 which is under spring influence.

In order that the gas may be conveyed into the explosion chamber at the moment when it is under the greatest pressure, viz., when the piston of the pump 7 is at its highest point, the spindle 16 of the valve 15 is connected with a two arm lever 17 against the free end 18 of which a tappet 19 seated on the auxiliary shaft 6 strikes and opens the valve 15 at the moment when the piston of the pump 7 is at its highest point. In precisely similar manner the igniting device which is not shown in the drawing can be provided by means of a tappet seated in the shaft 6 and which may actuate a sliding contact in the known manner. The ignition must be effected at the moment when the opened admission valve 15 has returned to its position of rest. For the purpose of producing the explosive mixture two further air pumps 20 and 21 (Figs. 1 and 11) are provided adjoining the gas pump 7. These are operated by eccentrics 22 arranged on the shaft 6 in such a manner that one of the two pumps always effects the suction stroke when the other forces the air into the pipe 23 that leads to the motor cylinder. The object of this is to enable air to be conveyed without interruption into the feed pipe 23. In other respects the pumps 20 and 21 are similar to the gas pump 7 each having two valves 26, 27, and 28, 29, the valves 27 and 29 being inserted in the air suction pipe 24 and the valves 26 and 28 being inserted in the feed pipe 23 that leads to the motor cylinder and being arranged adjacently in V form for the purpose of better utilizing the space (Fig. 11).

Beyond the purpose of continuous working mentioned above the doubling of the pumps has the further important purpose of producing overpressure in the explosion chamber, in order thereby to force the consumed mixture out of the motor cylinder at the given moment. For this purpose the air supply pipes 23 are formed in a special manner in the part where they open into the explosion chamber (Figs. 8 and 9). The air supply pipe 23 opens in fact into the explosion chamber in the form of a number of pipes seated in the form of a star around the motor shaft 2 and with their pointed end 30 directed toward said shaft. By this arrangement an adequate cooling of the motor shaft 2 in the interior of the explosion chamber is likewise effected. Moreover special valves are dispensed with, as under this arrangement the explosion gases are prevented from striking back into the air supply pipe.

In order to enable the consumed gases to escape a number of (in this case three) exhaust valves 31 are arranged in the end of the motor cylinder (Fig. 7) through which the consumed gases can escape in consequence of the over pressure prevailing in the explosion chamber and the air which is continuously flowing in. The opening of these valves is controlled from the main shaft in such a manner that the exhaust valves must open once at every two revolutions of the motor shaft 2, the motor therefor having a sequence of operation analogous to that of a four stroke cycle reciprocating motor. This controlling action from the main shaft is effected in the following manner. On the main shaft 2 is a star shape slide piece 32 (Fig. 6 and Fig. 6[a]) which is movable and has as many radial extensions 33 as there are valves to be operated. The reciprocating motion of the slide piece on the motor shaft is effected by means of a bevel wheel 34 seated on the shaft and engaging in a larger bevel wheel 35 which reciprocates a connecting rod 36 connected with the slide piece 32 and thereby the slide piece itself on the motor shaft. The slide piece strikes with each of its extensions 33 against a two arm lever 37 the outer arm of which has a spherical end 38, which presses against the valve 39 that is under spring pressure and each time an extension 33 strikes against the valve stems the levers 37 open the valves 31 seated in casings 40 attached to the ends of the cylinder and projecting in the axial direction of the cylinder. The sequence of operations having the analogy previously referred to is effected by suitable calculation of the number of teeth on the two bevel wheels 34 and 35 of which the larger viz., the wheel 35 has twice as many teeth as the smaller wheel 34 seated on the motor shaft 2.

In Fig. 2 the rotary drum 3 is shown with two special forms of the helical explosion grooves 4 provided on the circumference thereof, these grooves having a pitch and curvature suitable to the number of revolutions and to purposes of economy. In case of a number of drums being arranged tandemwise on one and the same shaft the grooves 4 are arranged at the beginning in different relative planes in the different front ends of the drums, (Figs. 3 and 4) for the purpose of insuring as uniform a motion of the drums as possible. In this case each single drum would have its special explosion chamber. The cooling is provided for in a manner suited to the present case and this provision may be in the form of a water jacket for the reception of the cooling water arranged around the motor cylinder as illustrated in Figs. 1 and 2.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a gas engine, the combination with a cylinder and a helically grooved drum therein of means for supplying gas to the cylinder, an air pipe having angularly extending branches projecting radially into one end of the cylinder and having reduced discharge ends, and an air pump communicating with said pipe.

2. In a gas engine, the combination with a cylinder and a helically grooved drum therein of means for supplying gas to the cylinder, an air pipe having a plurality of angularly extending branches projecting radially into the cylinder and each having an inwardly pointed reduced discharge end and an air pump communicating with said air pipe.

3. In a gas engine, the combination with a cylinder and a helically grooved drum therein of means for supplying gas to the cylinder, a valve at one end of the cylinder controlling the admission of gas thereto, a valve at the other end of the cylinder controlling the exhaust therefrom and operating means for the exhaust valve comprising a rotatable part having a crank pin, a lever directly controlling the movements of the exhaust valve, a slidable part which operates the lever and a link connecting the slidable part and the crank pin.

4. In a gas engine, the combination with a cylinder and a helically grooved drum therein, the cylinder having a combustion space at one side of the drum, of means for supplying gas to the combustion space, means for supplying air to the combustion space, exhaust valves located at the end of the cylinder opposite the combustion space and means for operating the exhaust valves.

5. In a gas engine, the combination with a cylinder and a helically grooved drum therein, the cylinder having a combustion space at one side of the drum, of a valve to control the admission of gas to the combustion space, means for supplying gas to the combustion space, independent means for supplying air to the combustion space, exhaust valves located at the end of the cylinder opposite the combustion space and means for operating the exhaust valves.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MAX RICHARD GÜTTLER.

Witnesses:
PAUL ARRAS,
WILHELM SCHMIDT.