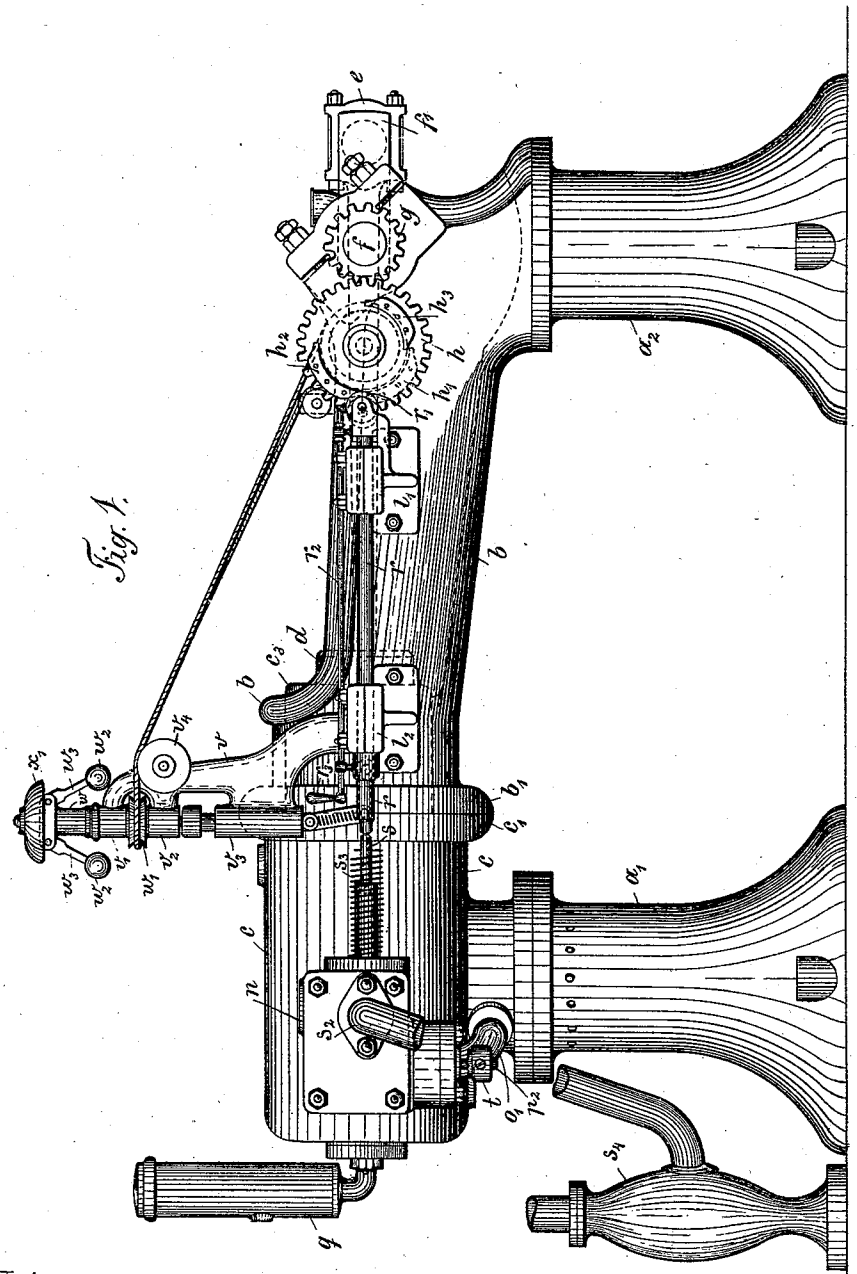
(No Model.) 3 Sheets—Sheet 1.

K. A. JAKOBSON.

GAS MOTOR.

No. 514,996. Patented Feb. 20, 1894.

Fig. 1.



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K. A. JAKOBSON.

GAS MOTOR.

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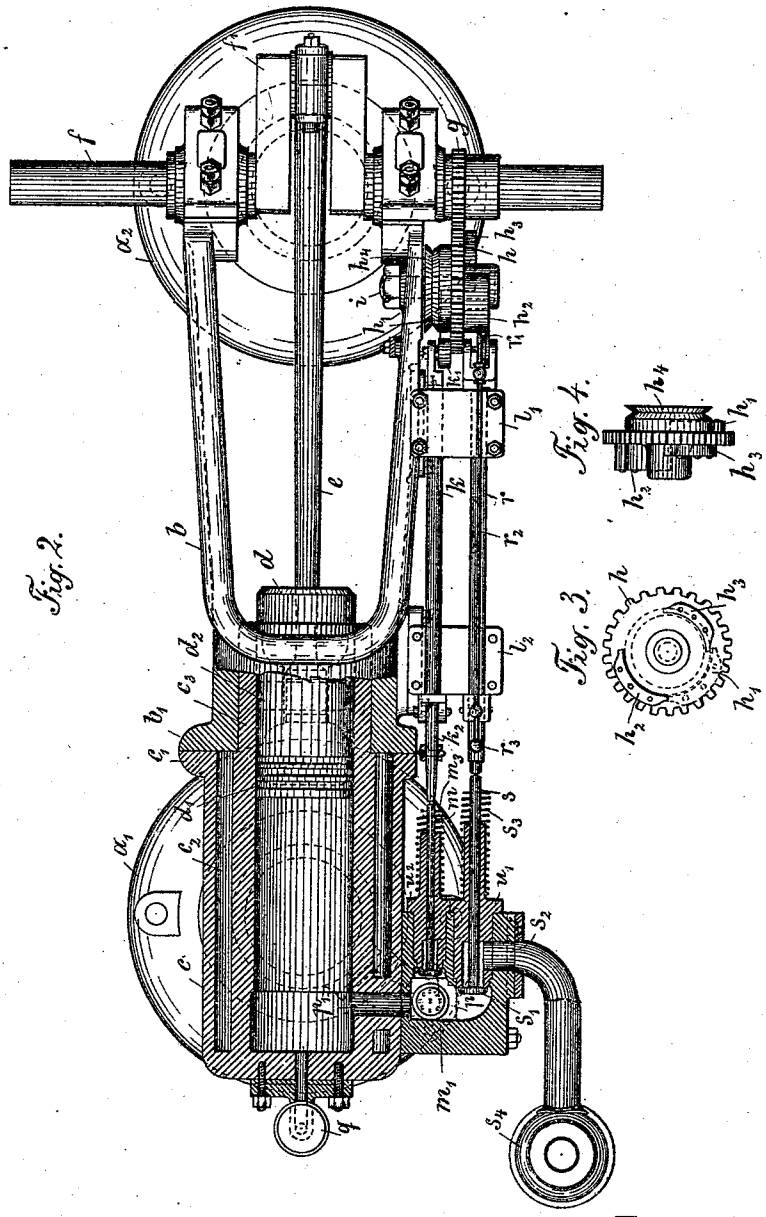

Fig. 2.

Fig. 4.

Fig. 3.

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K. A. JAKOBSON.

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Fig. 8.

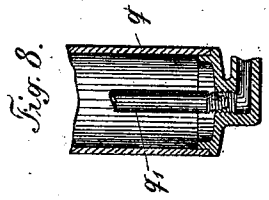


Fig. 7.

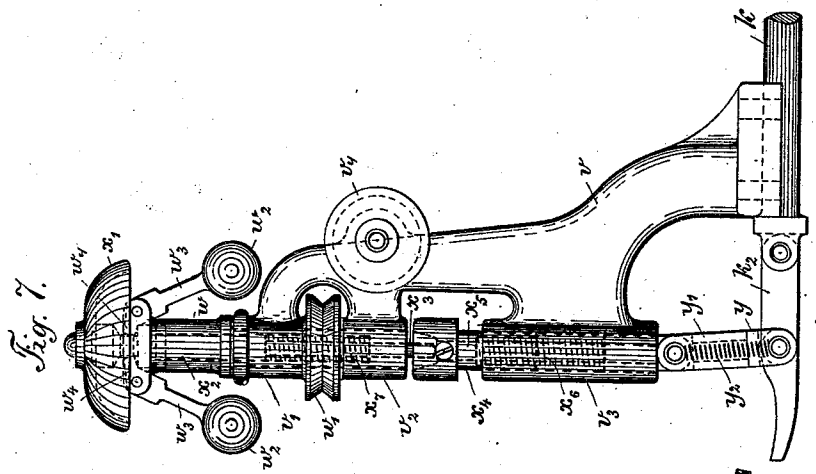


Fig. 5.

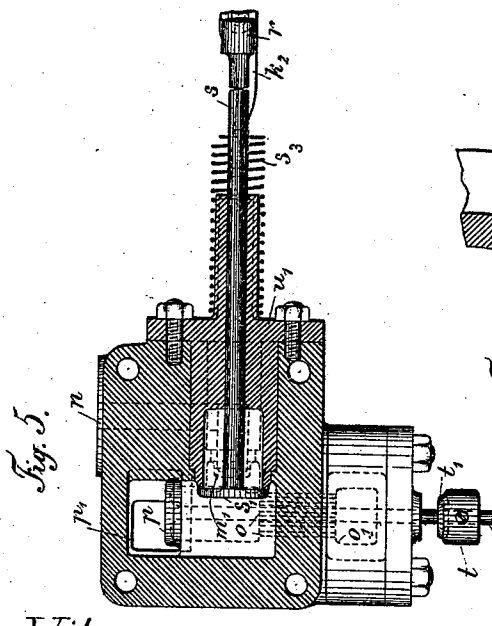
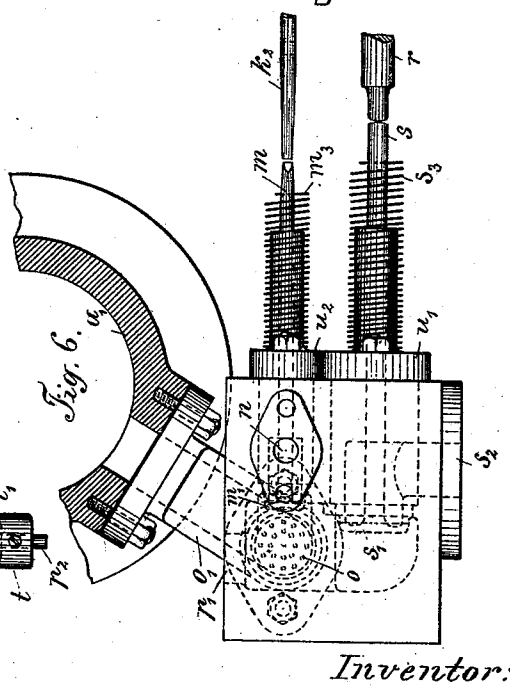


Fig. 6.



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UNITED STATES PATENT OFFICE.

KARL ALBERT JAKOBSON, OF CHRISTIANIA, NORWAY, ASSIGNOR TO L. A. ENGER & CO., OF SAME PLACE.

GAS-MOTOR.

SPECIFICATION forming part of Letters Patent No. 514,996, dated February 20, 1894.

Application filed December 13, 1892. Serial No. 454,976. (No model.)

To all whom it may concern:

Be it known that I, KARL ALBERT JAKOBSON, a subject of the King of Sweden and Norway, residing at Karl XII Gade, 3, Christiania, Norway, have invented a certain new and useful Improvement in Gas-Motors, of which the following is a specification.

My invention relates to gas engines or motors whereby I not only simplify their construction and economize the consumption of gas, but effect the mixture of gas and air before their entrance into the cylinder in a safe, complete and simple manner and secure the regulation of power of the machine by means of a simple arrangement of governor.

Referring to the drawings which form a part of this specification Figure 1 is a side elevation of a gas motor constructed according to my invention. Fig. 2 is a plan of the same partly in section. Figs. 3 and 4 are face and edge views respectively of the wheel which carries the cams or eccentrics. Fig. 5 is a side view partly in section of the valve box or casing. Fig. 6 is a plan of the same. Fig. 7 is a side elevation of the governor. Fig. 8 is a section of part of the ignition chamber showing the ignition tube. Figs. 5 to 8 are drawn to a larger scale than Figs. 1 to 4.

On standards a' a^2 (Figs. 1 and 2) is a frame b and cylinder c connected by screws passed through flanges b' c'. The cylinder c, provided with a water-jacket c^2 is continued as shown at c^3 in Fig. 2, into the frame b; d is the piston provided with springs d' and with a pivot d^2, to which is connected the connecting rod e, which through the crank f' on the shaft f operates the piston d up and down.

The actuation of the engine is effected by the following arrangement: g is a pinion, secured to the crank shaft f and serving to actuate a toothed wheel h. This toothed wheel h rotates on a spindle i at half the speed of the pinion g. To the toothed wheel h are fixed three cams or eccentrics h' h^2 h^3 (Figs. 1, 2, 3 and 4). The cam h' placed on the inner side of the toothed wheel h, operates at a certain point of the rotation on a roller k', which by a pivot is fixed to the rod k and forces the latter to slide in bearings l' l^2. The other end of the rod k is provided with a fork, to which is attached a lever k^2 connected to the governor of the engine, and when the latter is running at a normal speed acts upon the valve rod m of the valve m'. By this means the valve is opened and admits gas from the passage n (Figs. 1, 5 and 6). This gas is now mixed with air, which on account of the vacuum in the cylinder c enters from the standard a' through a tube o', passes in finely divided streams through the passages o and meets the gas coming through the valve m', with which it becomes intimately mixed, and further, on account of the vacuum, streams through the valve p and passage p' into the cylinder c, which is thereby filled. The piston d which is then in the position shown in Fig. 2 moves inward the valves m' and p close (the eccentric h' having passed the roller k') the compresson begins and the mixture is now forced into the ignition chamber q (Figs. 1, 2 and 8) until the piston reaches its innermost position, when as in the usual way the explosion takes place, and forces the piston outward. When the piston again returns, the exhaust which is performed in the following manner commences. On the side of the tooth-wheel h opposite that on which the cam h' is situated is a cam h^2 (Fig. 4). At a certain period of rotation of the toothed wheel h (when the explosion in the cylinder has taken place) the cam h^2 presses against a roller r' on a rod r which by this means similarly to the rod k, is caused to slide in the bearings l' l^2, and with its other end acts upon a valve rod s and valve s'; the latter is opened, and when now the piston d returns after the explosion, the exhaust gas is forced out through the passage p', valve s' and tube s^2 into the exhaust receiver s^4, until the plunger again moves back when a vacuum again takes place in the cylinder, and gas and air are again introduced as hereinbefore described and compressed for a fresh explosion. The valve rods m and s are provided with spiral springs m^3 and s^3, which keep the valves m' and s' closed, when the rods k and r are not acted upon by the cams h' and h^3. r^2 is a rod arranged to be rotated in bearings on the rod r and at one end furnished with a handle r^3 the other end which is angular being adapted to catch in a groove in the roller r'. The roller r' can by the rod

r^2 be moved somewhat aside on its pivot so that the cam h^3 (Fig. 4) which projects less than h^2 can as the toothed wheel h rotates, be caused to press upon the roller r' and slightly open the valve s' by which the compression may be diminished at starting. A further advantage of this arrangement is, that in starting by hand engines having two or more cylinders only the resistance due to the compression in one cylinder is to be overcome the arrangement of the pressure releasing mechanism hereinbefore described upon the other cylinder opening the valve s' so that no compression takes place. The first cylinder can thus start the others. t (Figs. 1 and 5) is an adjustable collar secured by a screw on the valve-rod p^2 on the valve p. On this collar t is placed an india-rubber ring t' in order to deaden the noise caused by contact of the valve with the casing and by which collar the stroke of the valve p is regulated.

u' and u^2 are two guide-boxes for the rods s and m; they are furnished with openings which correspond with the passages n and s^2. The ignition tube q' in the ignition chamber q is (as shown in Fig. 8) furnished with a conical screw thread while the opening into which the tube is screwed, is cylindrically threaded, by which means the tube can more easily be freed, when it has been burned fast to the chamber after use for a long time.

The governor of the motor is illustrated in Figs. 1 and 7. The standard v of the governor rests on the bearing l^2 and has three arms v', v^2, v^3 in the form of tubes or sleeves. In the sleeves v' and v^2 revolves a hollow spindle w on which a pulley w' is keyed. This pulley w' actuates the spindle w by a cord passing over a pulley h^4 on the toothed wheel h and pulleys v^4, v^4 on the standard v (Fig. 1); the spindle w has at the top two regulating balls w^2, w^2 suspended as usual by arms w^3, w^3 which have noses w^4, w^4 working in a groove in a plunger x^2 which is furnished with a cap x'. By the outward movement of the balls (when the speed of the engine is forced) the plunger x^2 will be pressed downward and will by means of a rod x^3 bear upon a piston x^4 having a rod x^5 which rod again through an intermediate arm forces the lever k^2 on the rod k (Figs. 2 and 7) downward, so that it will not act on the valve rod m, but pass under the same; the supply of gas to the machine is stopped until the speed slackens, and causes the balls w^2, w^2 to fall, whereby the arm k^2 is again raised by the action of springs x^6 and x^7. The link connecting the bar x^5 and the arm k^2 consists of two parts, viz. an inner pin or pivot y and an outer sleeve y' which are connected by two spiral springs y^2, y^2 in such a manner that when the arm k^2 passes under the valve rod m the link will yield in order to avoid the gas valve becoming bent.

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

In combination, the cylinder and sliding rod, the inlet valve with its stem, the rod k for operating the said stem and having a hinged portion k^2, the standard on the engine frame, the sliding rod x^4 having a rod x^5 movable through the standard, the link connection between the sliding rod and the hinged portion k^2, the spring within the standard for forcing the sliding rod upwardly and the means for forcing the sliding rod with its rod x^5 and link connection downward consisting of the governor having the vertically movable stem engaging the sliding rod, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 2d day of November, 1892.

KARL ALBERT JAKOBSON.

Witnesses:
RICHARD EMANUEL STOKK,
AAL GOTTFRED GRÖNN LAHN.