

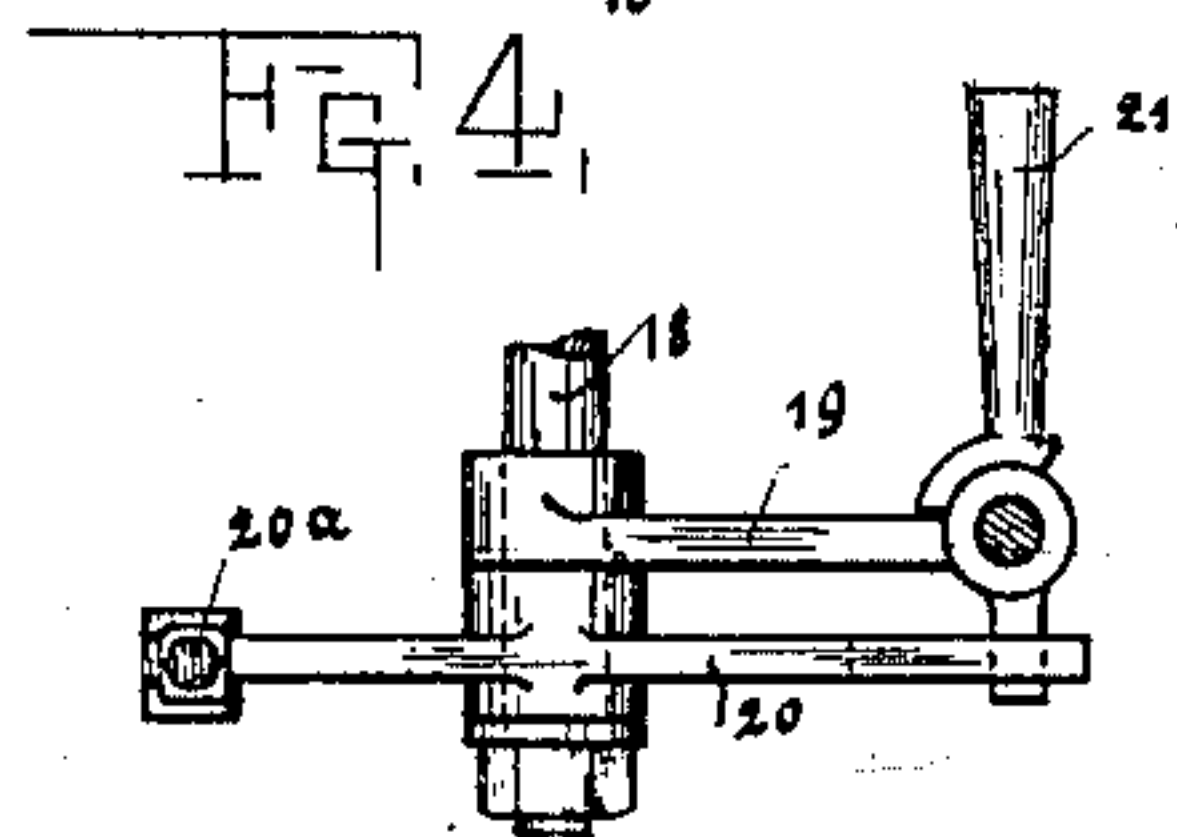
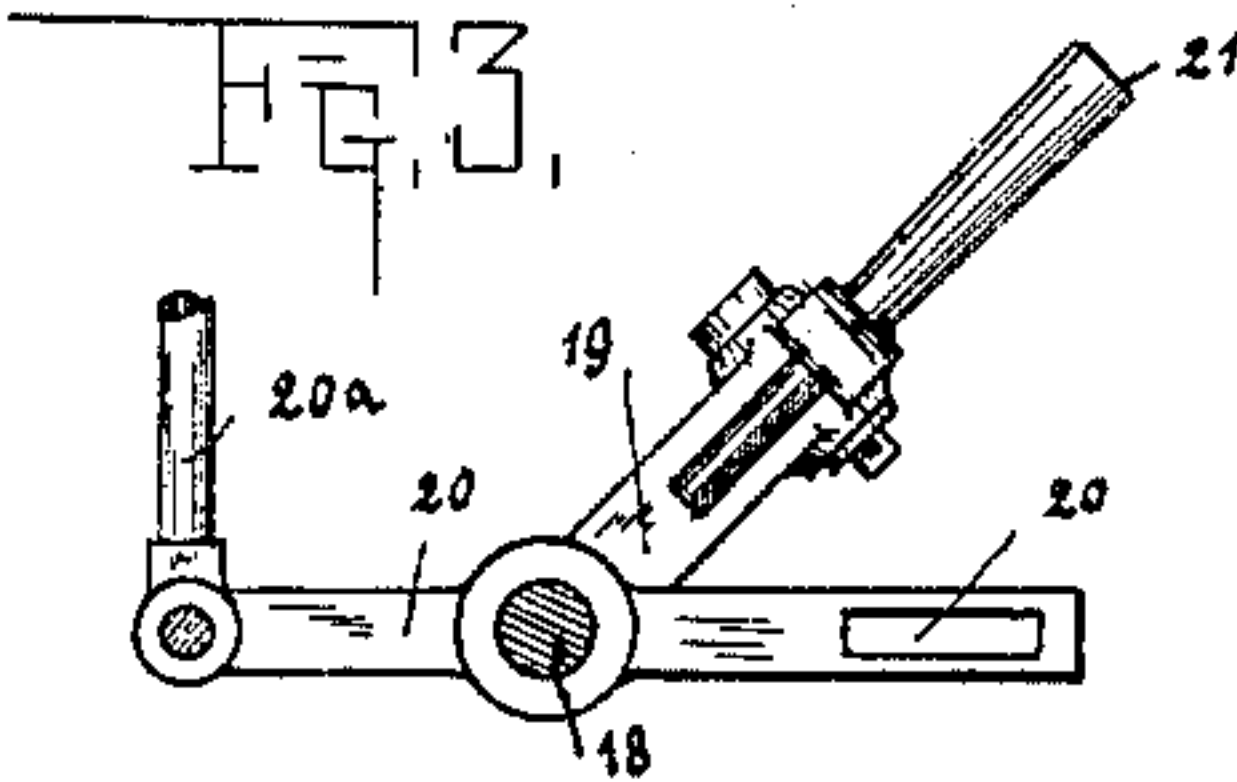
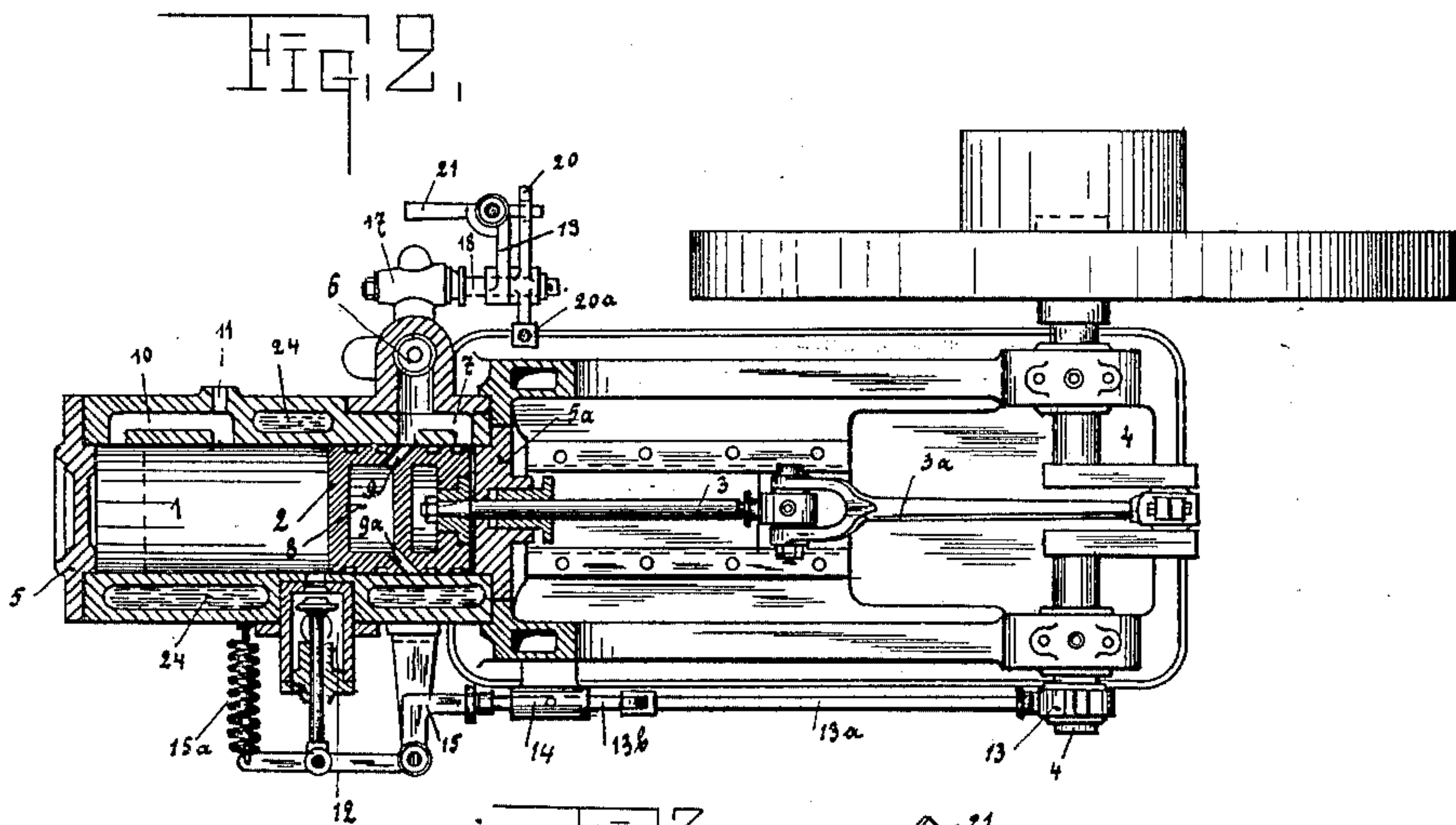
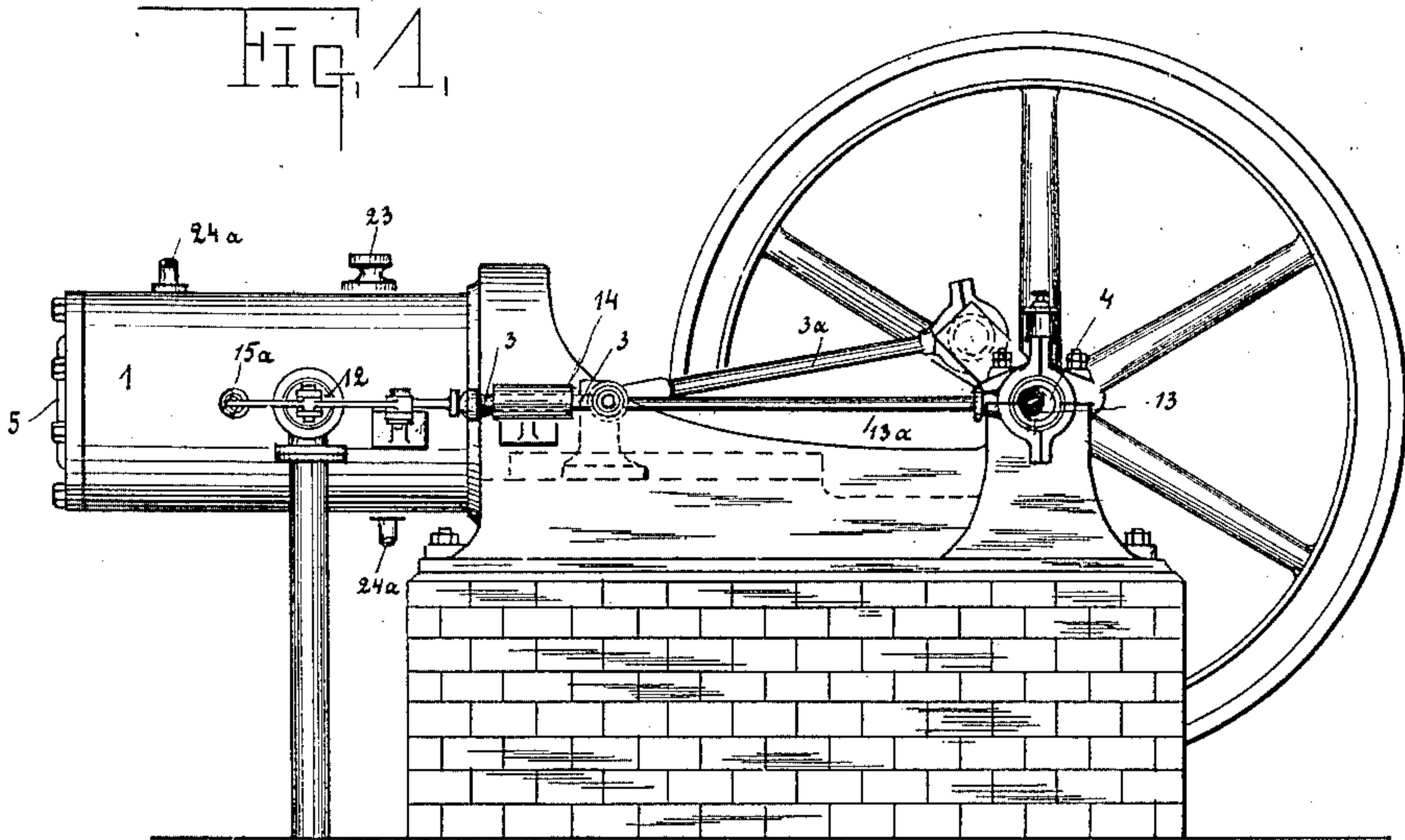
No. 630,083.

Patented Aug. 1, 1899.

G. HIRT & G. HORN.
EXPLOSIVE GAS ENGINE.

(Application filed Oct. 24, 1898.)

(No Model.)



Witnesses:

J. Buehler.
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Inventors:

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UNITED STATES PATENT OFFICE.

GEORG HIRT AND GEORG HORN, OF NUREMBERG, GERMANY.

EXPLOSIVE-GAS ENGINE.

SPECIFICATION forming part of Letters Patent No. 630,083, dated August 1, 1899.

Application filed October 24, 1898. Serial No. 694,412. (No model.)

To all whom it may concern:

Be it known that we, GEORG HIRT, railway director, Trosstrasse 10, and GEORG HORN, mechanic, aussere Sulzbacherstrasse 15, subjects of the King of Bavaria, residing at Nuremberg, in the Kingdom of Bavaria and German Empire, have invented certain new and useful Improvements in Two-Cycle Explosion-Engines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Most of the gas-motors hitherto in use are of the four-cycle type. To do away with the many disadvantages dependent on this system and at the same time to attain a greater working effect is the aim of the present invention, which involves a two-cycle motor and by which the work is so distributed that an effective stroke occurs at every revolution.

In the accompanying drawings a gas-motor constructed according to the invention is shown in Figures 1 and 2 in side elevation and horizontal section, respectively, while Figs. 3 and 4 show the lever which works the gas-valve in two positions.

In cylinder 1 moves a piston 2, which by means of the piston-rod 3 stands in connection with the cross-head and by means of the piston-rod 3^a with the shaft 4. The cylinder is closed at each end by the plates 5 and 5^a and is in order to take up the cooling-water furnished with a hollow space or chamber 24. The piston is furnished with an interior chamber 8, which by means of the perforations 9 and 9^a is connected at the proper moment with the canals 7 and 10. The firing takes place at 11 by any of the known contrivances. The cylinder has the inlet and outlet valves 6 and 12, the pipe 24^a for connecting with the cooling-water conduit, and a suitable oil-cup 23 for holding a lubricator for the piston. Valve 6 is self-acting and permits the entrance of the gas mixture. The rear end of the gas-cock 17 has an extension 18, which is for the reception of the levers 19 and 20, the former of which is fixed and has a movable-handle 21, while lever 20^a is fitted to be turned with the extension and has a projection 20^b, which is con-

nected with the governor. The exhaust-valve 12 has a spring 15^a and is opened and closed by means of the angle-lever 15. For this purpose the pitman-rod 13^a, moved by the eccentric on the shaft 4, is connected with a sliding rod 13^b, which strikes against the angle-lever 15, and thus raises the valve.

To start the engine, the handle 21 is brought into the position shown in Fig. 4. Its lengthened part then enters a slot in the lever 20, and the connection with the governor and the gas-cock is produced. To stop the engine, the handle only requires to be brought into the position indicated in Fig. 3. The lever 20 then plays freely in the axle 18, and the cock 19 can be closed by a motion of the hand.

The operation of the machine is as follows: When the piston 2 moves out of the dead position from right to left, Fig. 2, through the mixture-valve 6, fresh gas mixture is brought into the chamber before the piston and compressed at the back motion of the piston. By this compression the gas mixture is brought, by means of the canal 7 and the perforation 9, into the space 8. This operation is performed for the reason that it is not possible to conduct the sucked-in mixture, on account of the danger of premature firing, direct into the firing-space behind the piston. If the piston moves from the dead position a little to the left, opening 9 is closed and the compressed mixture then remains inclosed in 8 till the canal 10 and the perforation 9 are connected, when the mixture escapes and is at once fired on passing the firing-point 11, so that it drives the piston forward in its working stroke. Meanwhile the outlet-valve 12 has been opened and remains so till the piston has finished its stroke. The combustion products have thus an opportunity of exhausting down to atmospheric pressure. The residue is compressed on the back motion of the piston. In this way a certain counter-pressure and high temperature prevail on the passage of the fresh mixture into the firing-space, so that a loss of tension in the fresh mixture is avoided. At every back stroke of the piston there is fresh gas mixture and at the same time transfer of the compressed mixture in the piston-space into the firing-

space and the likewise immediate firing of the same. At every forward stroke of the piston the combustion products are exhausted and at the same time the fresh mixture before the piston is compressed, &c.

5 The outlet-valve 12 has a double effect—that is, by the forward motion of the piston the connection of the perforation 9 and the hollow space 8 on the one side and the canal 10 on the other side is intercepted, and therefore a certain quantity of combustion products remains at a higher pressure than the atmospheric pressure. Perforation 9^a serves to remove the residue before the reception of 15 the fresh mixture. As soon as this passes the valve 12, which is opened on the forward motion of the piston, the burned gases escape, and there only remains a small and innocuous remnant under atmospheric pressure.

20 Having thus described our invention, what

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

In a gas-engine, a cylinder provided at one end with a receiving-chamber and at the other end with a working chamber, and an exhaust- 25 port midway between the ends of the cylinder and controlled by an automatically-operated valve, in combination with a piston having formed therein a chamber, ports communicating said piston-chamber with the receiver 30 and working chambers and with an exhaust-port of the cylinder at predetermined periods of the stroke, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

GEORG HIRT.
GEORG HORN.

Witnesses:

ALEX WIELE,
MAX SCHNEIDER.