

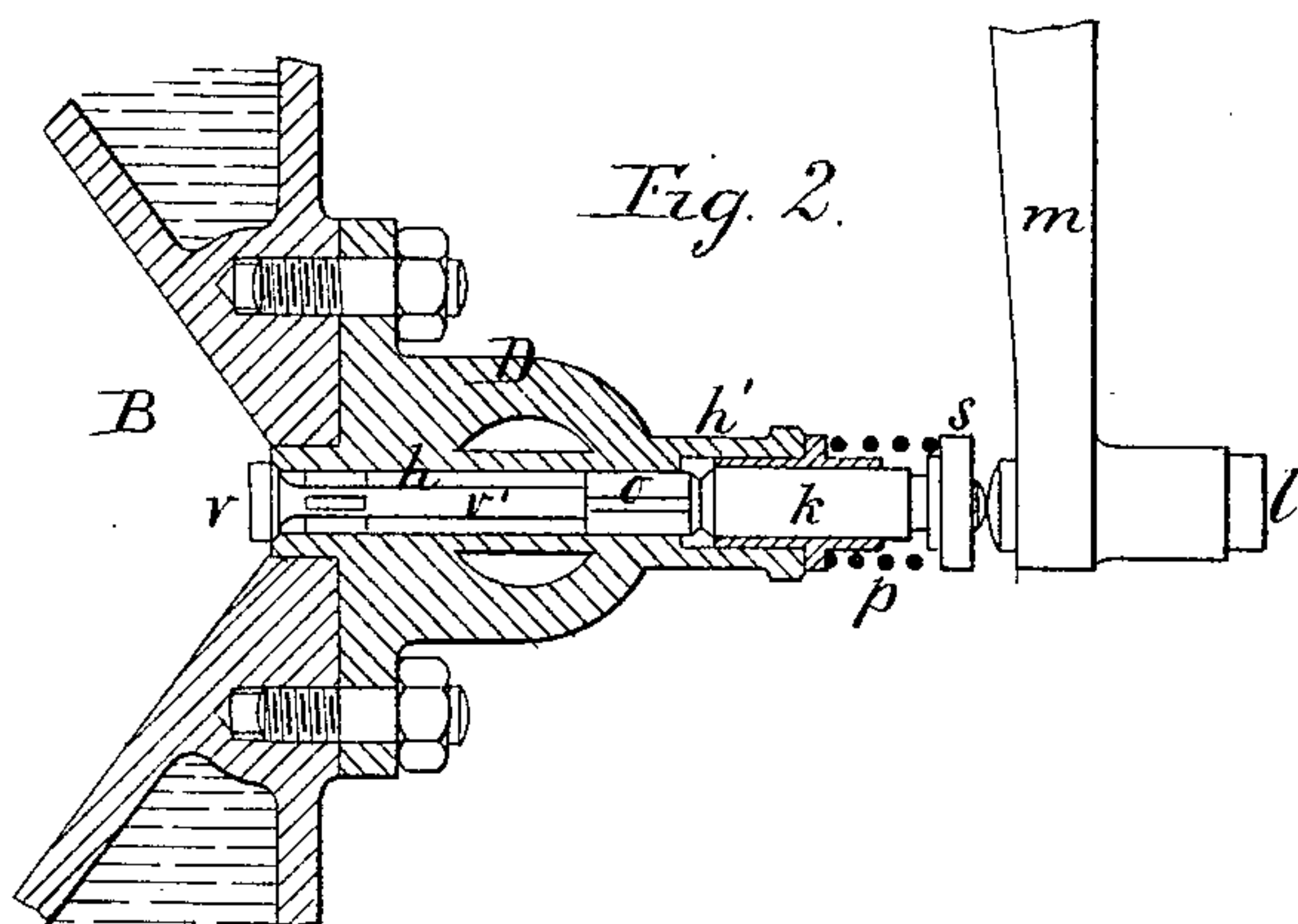
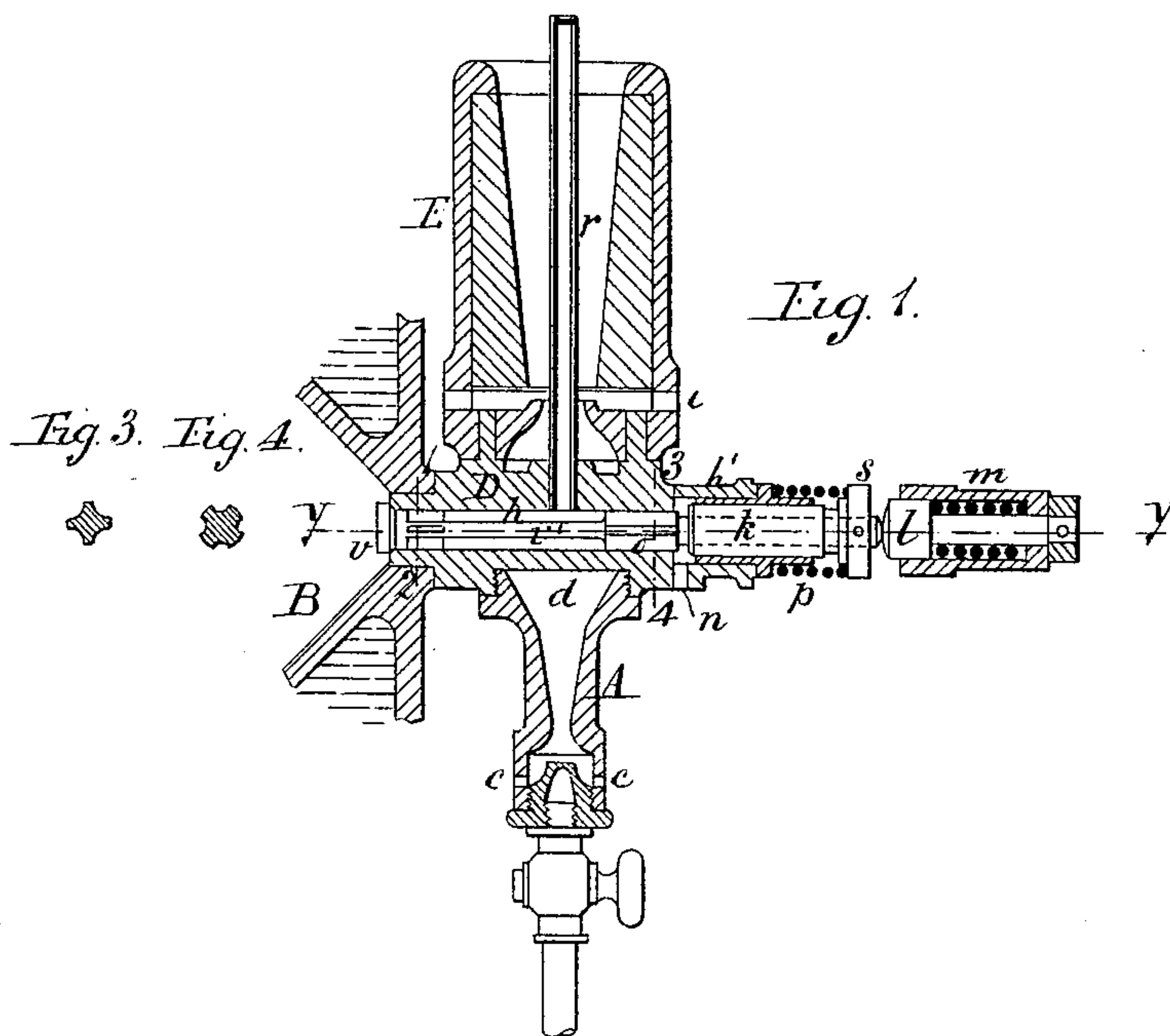
(No Model.)

N. A. OTTO.

IGNITING APPARATUS FOR GAS MOTOR ENGINES.

No. 388,303.

Patented Aug. 21, 1888.



Witnesses.

J. A. Rutherford.
Albert G. Watt.

Inventor.

Nicolaus A. Otto.

By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

NICOLAUS AUGUST OTTO, OF COLOGNE, PRUSSIA, ASSIGNOR TO THE GAS
MOTOREN FABRIK DEUTZ, OF DEUTZ-ON-THE-RHINE, GERMANY.

IGNITING APPARATUS FOR GAS-MOTOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 388,303, dated August 21, 1888.

Application filed February 9, 1888. Serial No. 263,480. (No model.) Patented in Germany November 3, 1887, No. 43,630; in
England January 16, 1888, No. 688; in Belgium January 26, 1888, No. 80,392, and in Italy March 31, 1888, No. 23,003.

To all whom it may concern:

Be it known that I, NICOLAUS AUGUST OTTO, a citizen of Prussia, residing at Cologne, in the German Empire, have invented a new and useful Improvement in Igniting Apparatus for Gas-Motor Engines, (for which I have obtained a patent in Germany, November 3, 1887, No. 43,630; in Belgium, January 26, 1888, No. 80,392; in Italy, March 31, 1888, No. 23,003, and have made application for patent in Great Britain January 16, 1888, No. 688,) of which the following is a specification.

This invention relates to a construction of igniting apparatus for gas-motor engines described in the specification to my application for a patent, Serial No. 250,735, dated 1887, in which a horizontal passage communicating with the igniting-port of the engine-cylinder through an igniting-slide had at an intermediate point of its length a vertical igniting-tube that was heated externally by the flame of a Bunsen burner which surrounded it, so that on the said passage and tube being put in communication with the cylinder-port by the igniting-slide the compressed charge in the cylinder passed into the said passage and heated tube, and, becoming ignited by the latter, effected the firing of the charge. With this arrangement a portion of the combustion-gases resulting from such ignition remained in the part of the tubular passage extending beyond the vertical heated tube; and the present improvements have mainly the further object to enable such combustion-gases to be entirely removed after the firing of each charge.

Figure 1 shows a vertical section. Fig. 2 shows a sectional plan on line *y y*, Fig. 1; and Figs. 3 and 4 show cross-sections of the valve-stem at 1 2 and 3 4.

Instead of governing the communication between the igniting apparatus and the cylinder by a slide, as in the before-mentioned application, such communication is in the present arrangement governed by a valve, *v*, which closes the horizontal passage *h*, formed through the casing *D*, carrying the igniting-tube *r*, which is heated by the Bunsen-burner arrangement *A c d E i* in precisely the same manner as previously described. The valve *v* has a stem, *v'*, passing outward through the hori-

zontal passage *h*, the stem being formed with guiding-ribs just behind the valve, as at Fig. 3, while in the part of the passage beyond the igniting-tube *r* it is formed as a piston, *o*, with one or more small longitudinal grooves, as at Fig. 4. The stem is extended beyond this piston and carries a second piston, *k*, sliding in an enlarged extension, *h'*, of the passage *h*, the inner end of which piston, situated a short distance from piston *o*, is formed as a valve, so that when pushed inward it entirely closes the outer end of the passage *h*.

In the extension *h'* an opening, *n*, is formed communicating with the atmosphere, so that when the two pistons are in the position indicated the interior of passage *h* communicates with the atmosphere through the channels in the piston *o*, and thus the combustion products remaining in the passage *h* after an ignition will partly escape. The valve *v* is kept closed by a helical spring, *p*, acting against a collar, *s*, on the outer end of the valve-stem, and it is forced open at the proper moment by a lever, *m*, actuated by a cam on the engine-shaft, and having a spring-stud, *l*, pressing against the outer end of the valve-stem, the lever *m* having to overcome the pressure exercised by the compressed charge upon the valve and that of the spring *p*, in order to force open the valve. When the valve is forced open for the ignition of the compressed charge, a portion of the latter will enter passage *h* and tube *r*, and will at the same time force the remaining combustion-gases from the former through the channels of pistons *o* into the atmosphere. This communication with the atmosphere will, however, only remain open momentarily, as the valve end of the piston *k* will almost immediately seat upon and close the end of the passage *h*, so that this will be closed by the time the combustible charge in passage *h* and tube *r* has become ignited, and the resulting flame will consequently be forced inward through the valve *v*, so as to fire the charge in the cylinder *B*. The lever *m* recedes again before the next compression-stroke, so that the valve *v* is closed by the spring *p*.

Having thus described the nature of this invention and the best means I know for carrying the same into practical effect, I claim—

In igniting apparatus for gas-motor engines, the combination of a passage, *h*, communicating with the engine-cylinder and with an igniting-tube, *r*, heated externally by a Bunsen
5 burner, a valve, *v*, closing said passage and connected, first, to a piston, *o*, having one or more channels communicating with the atmosphere, and, secondly, to a second piston, *k*,
10 acting as a valve for closing the outer end of the passage *h* immediately after the valve *v* has been forced open for igniting the compressed charge, and means for operating the valve and

pistons, substantially as and for the purposes herein described.

In testimony whereof I have signed my name 15 to this specification, in the presence of two subscribing witnesses, this 26th day of January, A. D, 1888.

NICOLAUS AUGUST OTTO.

Witnesses:

PETER LANGEN,

Köln.

WILHELM RINCK,

Deutz.