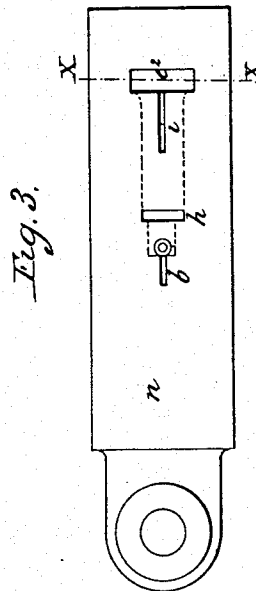
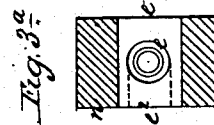
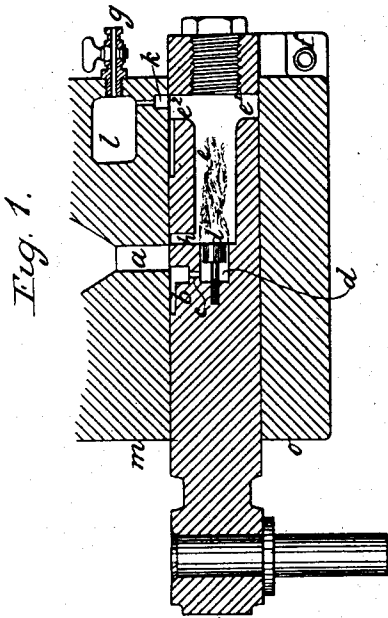
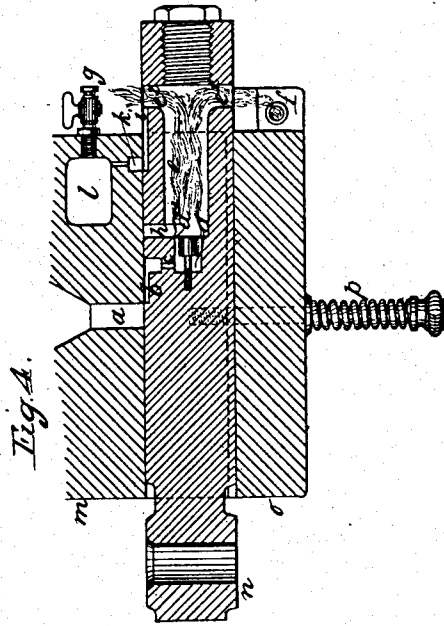
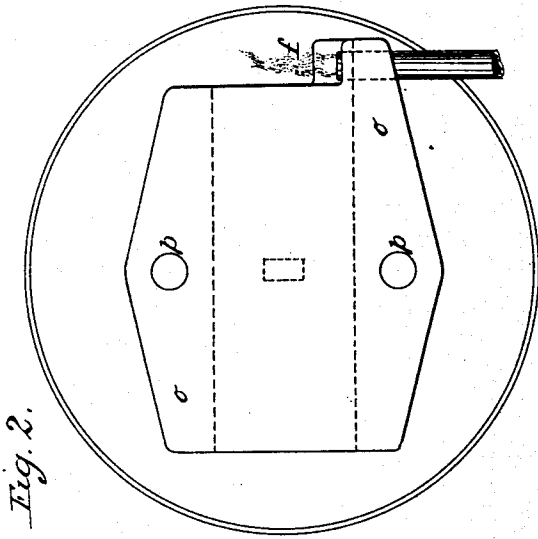


(No Model.)

N. A. OTTO.  
GAS MOTOR ENGINE.

No. 365,701.

Patented June 28, 1887.



Witnesses.

J. A. Rutherford  
Robert Emmett.

Inventor:  
Nicolaus A. Otto.

By James L. Norris.  
Att'y.

# UNITED STATES PATENT OFFICE.

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

## GAS-MOTOR ENGINE.

SPECIFICATION forming part of Letters Patent No. 365,701, dated June 28, 1887.

Application filed February 17, 1887. Serial No. 227,932. (No model.) Patented in England January 19, 1887, No. 847; in Belgium February 3, 1887, No. 76,214, and in Italy February 24, 1887, XLII, 8.

*To all whom it may concern:*

Be it known that I, NICOLAUS AUGUST OTTO, a citizen of Prussia, residing at Deutz-on-the-Rhine, in the Empire of Germany, have  
5 invented a new and useful Igniting Apparatus for Gas-Motor Engines, (for which I have obtained patents in Italy, dated February 24, 1887, Vol. XLII, No. 8; Belgium, dated February 3, 1887, No. 76,214, and have made ap-  
10 plication for patent in Great Britain, No. 847, dated January 19, 1887,) of which the following is a specification.

This invention relates to an improved construction of apparatus for igniting the charges  
15 of those gas-motor engines in which the charge is subject to compression before ignition.

The apparatus consists of a slide that is pressed against a slide-face of the cylinder by means of a loose cover acted on by springs, and  
20 is worked by suitable gearing from the engine-shaft, such slide being provided with ports and passages arranged and operating as I will proceed to explain with reference to the accompanying drawings, in which—

25 Figure 1 shows a horizontal section of the apparatus at the moment of igniting the cylinder-charge. Fig. 2 shows an end elevation. Fig. 3 shows a view of the inner face of the slide. Fig. 3<sup>a</sup> shows a cross-section on line  
30 X X, Fig. 3; and Fig. 4 shows the same view as Fig. 1, with the slide at its extreme right-hand position.

*m* is part of the gas-motor engine, provided with a slide-face and an igniting-port, *a*, the  
35 ports and devices for admitting the combustible charge into the cylinder not being shown, these being of any suitable known construction.

*n* is the igniting slide, and *o* is the slide-  
40 cover, pressed against the slide by springs *p*. The slide *n* has on its inner face a recessed groove, *b*, communicating by a small aperture, *c*, with a chamber, *d*, having a narrow annular aperture, *d'*, opening into one end of  
45 a passage, *e*, the other end of which communicates by two opposite side openings, *e' e''*, with the outer air when the slide is in the position

Fig. 4. Thus, as the slide moves from the position Fig. 4 toward the left, a portion of the compressed combustible charge will pass from  
50 the cylinder through port *a*, channel *b*, and opening *c* into chamber *d*, whence it issues through aperture *d'* into passage *e*, and in escaping through the opening *e'* it becomes ignited by the stationary gas-frame at *f*. By  
55 means of the restricted area of the channel *b* and openings *c* and *d'* the pressure of the gases becomes considerably reduced on its way from the cylinder to the passage *e*, so that the gas issues with only slight pressure from the open-  
60 ing *d'*. The flame at *e'* will burn slowly backward into the passage *e*, and will then continue to burn as an annular jet from the orifice *d'*. The striking back of the flame into  
65 the passage *e* is facilitated by the opposite positions of the openings *e' e''*. As the slide moves to the left, the flame in *e* will continue to be fed from the cylinder through the channel  
70 *b*, and at a certain point of this motion the openings *e' e''* will be covered by the cylinder and slide-cover, so that *e* will become a closed space.

In order to allow of the escape of the products of combustion from the flame at *d'* under these circumstances, a channel, *i*, in the  
75 slide establishes a communication between *e* and a passage, *k*, leading into a chamber, *l*, that communicates with the outer air by a cock, *g*. The flame thus continues to burn in *e* until the slide arrives at the position  
80 Fig. 1, in which the communication between *a* and the chamber *d* is just about to close and the igniting-port is just about to be put in communication with the flame at *d'* by the passage *h*, so as to fire the cylinder-charge.  
85

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

1. Igniting apparatus for gas-motor engines, consisting of a slide, *n*, having a channel, *b*, communicating by a small hole, *c*, with  
90 a chamber, *d*, that in its turn communicates by an annular opening, *d'*, with a passage, *e*, having opposite lateral openings *e' e''*, the

passage *e* being made to communicate with the firing-port of the engine by a passage, *h*, substantially as herein described.

2. In combination with the passage *e e' e''* of the igniting-slide *n*, the chamber *l*, communicating with the outer air by a regulating-cock, *g*, and with the said passage by an opening, *k*, substantially as herein described.

In testimony whereof I have signed my name

to this specification, in the presence of two subscribing witnesses, this 1st day of February, A. D. 1887.

NICOLAUS AUGUST OTTO.

Witnesses:

PETER LANGEN,

*In Deutz b. Köln.*

EDUARD KIRSCHSIEFER,

*In Mülheim-on-Rhine.*