

No. 785,687.

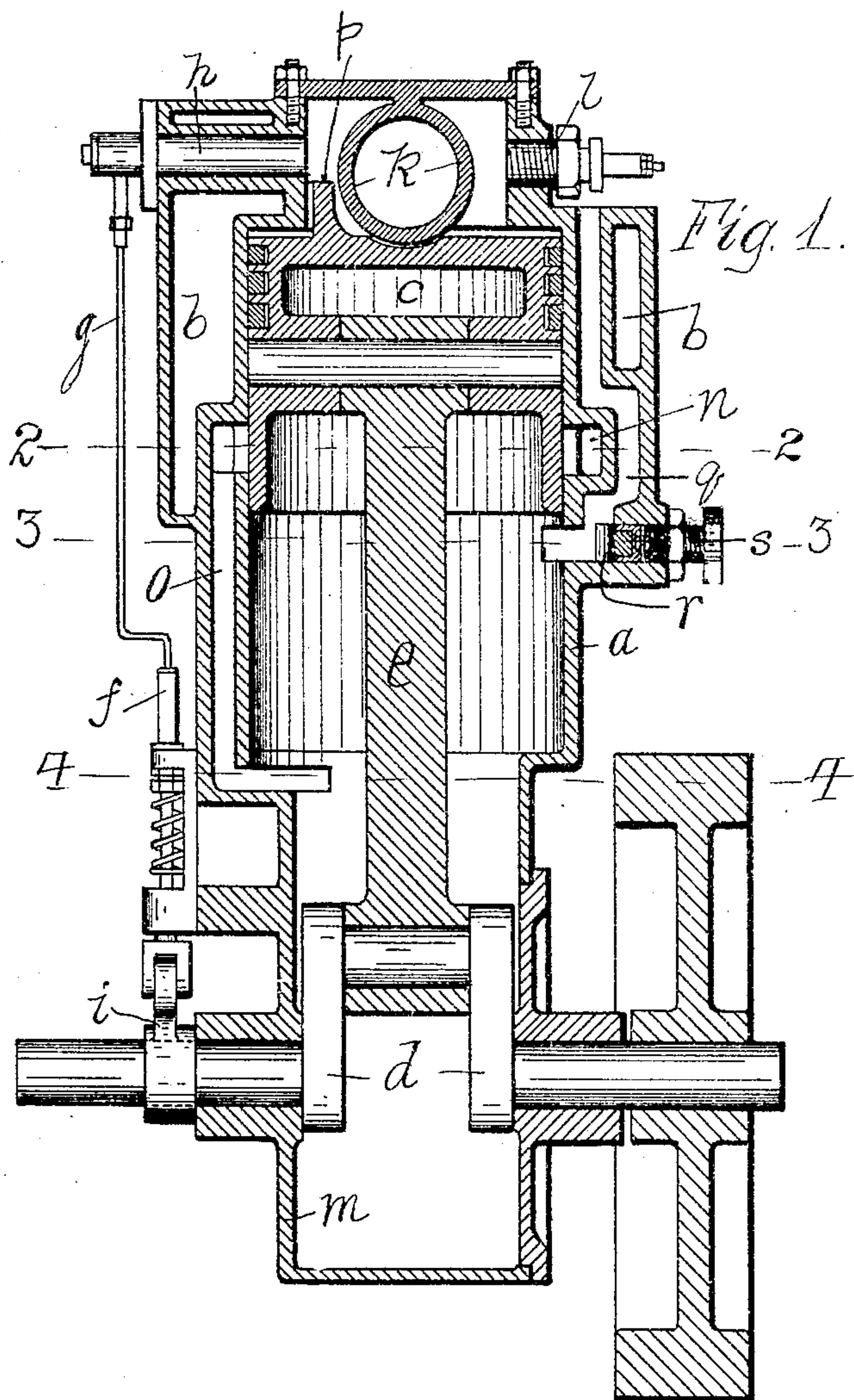
PATENTED MAR. 21, 1905.

N. L. & W. W. TUCK.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED JULY 22, 1903. RENEWED FEB. 21, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

*Herman Lewis*  
*Frank Ryall*

*Nelson L. Tuck,*  
*Wm. W. Tuck,*

INVENTORS:

BY *Richard W. Barkley,*

ATTORNEY.

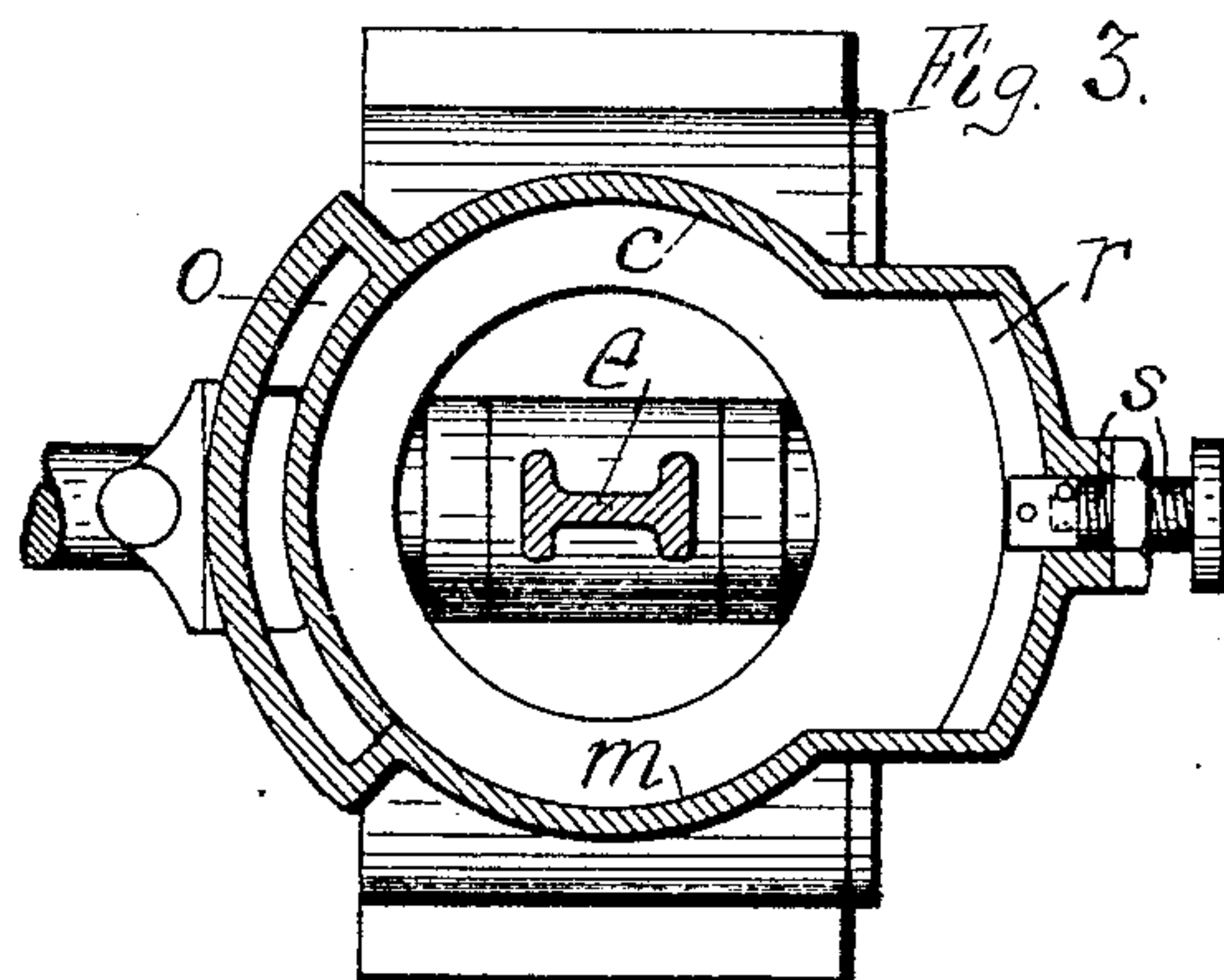
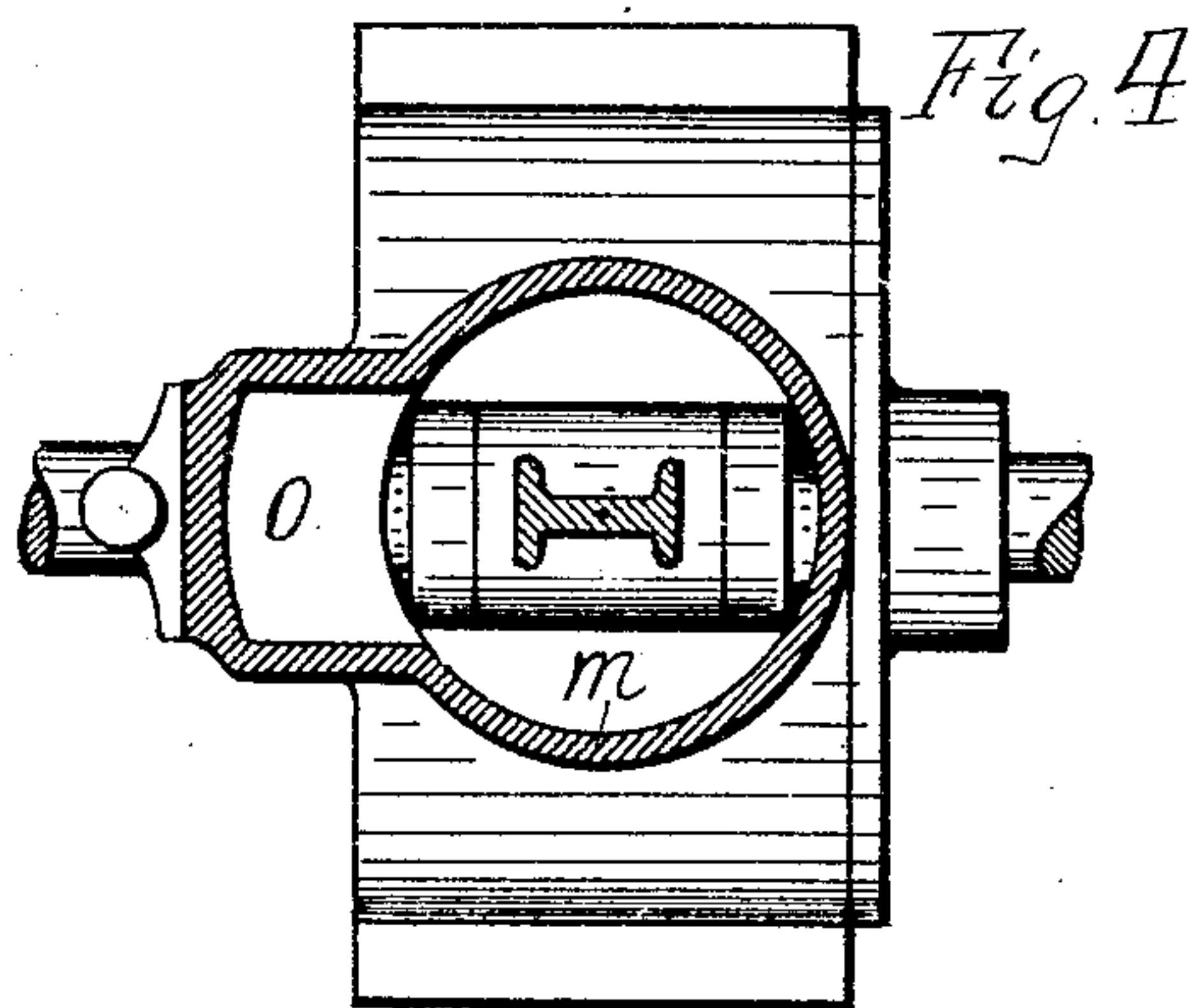
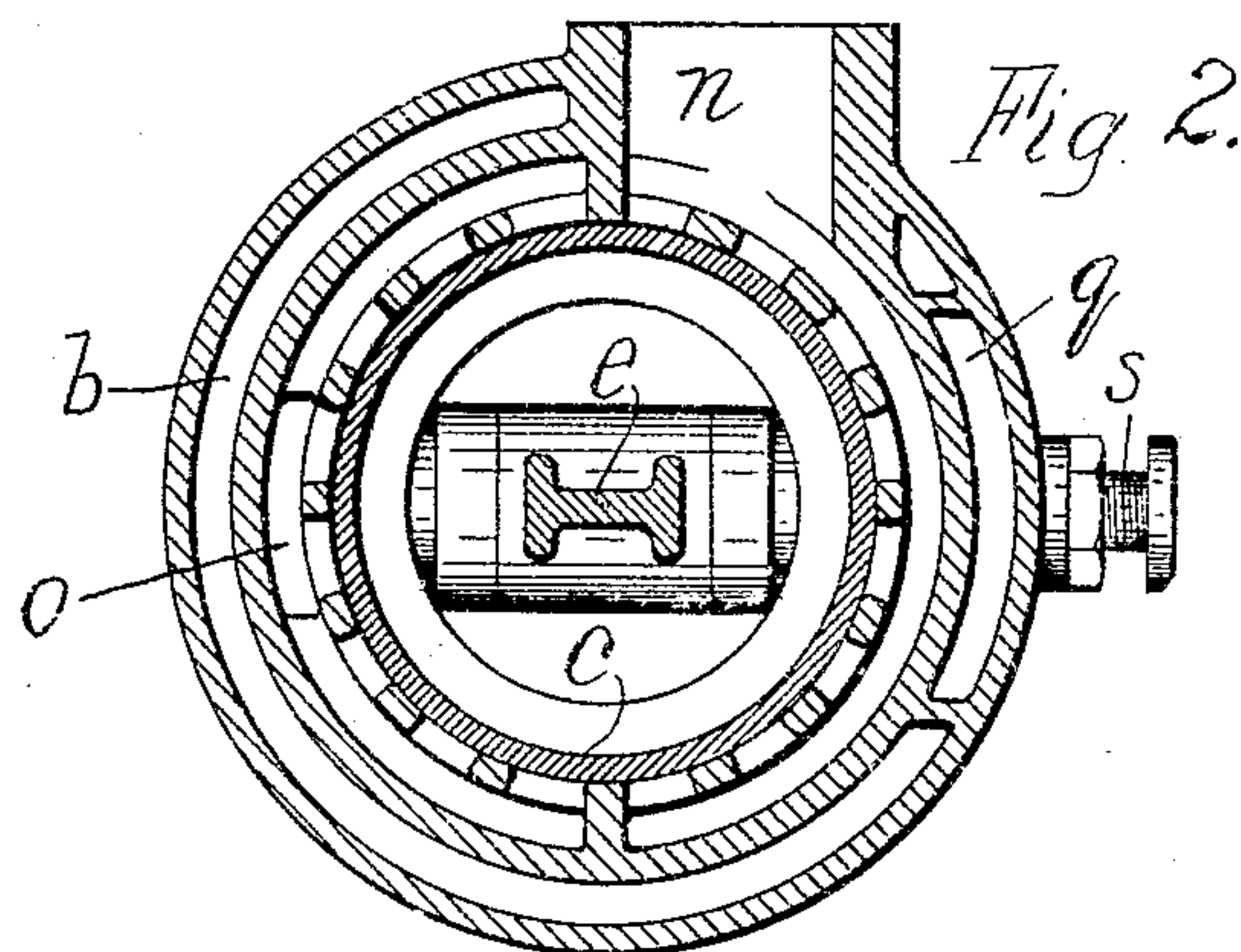
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*W. W. Tuck,*  
INVENTORS:

BY *Richard W. Barker,*  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

NELSON L. TUCK AND WILLIAM W. TUCK, OF BROOKLYN, NEW YORK.

## INTERNAL-COMBUSTION ENGINE.

SPECIFICATION forming part of Letters Patent No. 785,687, dated March 21, 1905.

Application filed July 22, 1903. Renewed February 21, 1905. Serial No. 246,782.

*To all whom it may concern:*

Be it known that we, NELSON L. TUCK and WILLIAM W. TUCK, citizens of the United States, and residents of Brooklyn, in the county  
5 of Kings and State of New York, have invented a certain new and useful Improvement in Internal-Combustion Engines, of which the following is a specification.

The present invention relates to internal-  
10 combustion engines, and has for its object the provision of means for securing a regulated supply of fresh air for the mixture which is subsequently exploded to drive the engine.

To this end the invention consists of the fea-  
15 tures and combinations hereinafter described, and more particularly pointed out in the appended claims.

In the accompanying drawings, (two sheets,) forming part hereof, Figure 1 is a vertical  
20 sectional view of an internal-combustion engine in which the invention is embodied. Figs. 2, 3, and 4 are sections taken respectively on the planes indicated in Fig. 1 by the lines 2 2, 3 3, and 4 4.

25 In the drawings, reference *a* marks the cylinder, which is provided with a jacket-space *b*. *c* is the piston; *d*, the crank-shaft; *e*, the rod connecting the piston and crank-pin; *f*, a pump for supplying fuel through a tube *g* and fuel-injector *h*; *i*, a cam for operating the pump; *k* *l*, igniters, and *m* a casing open-  
30 ing into the cylinder and in connection with the cylinder completely inclosing the crank, rod, and piston.

35 The reference *n* marks the usual exhaust, *o* a by-pass for the air to pass from the back to the front of the piston, and *p* a deflector for such air.

The foregoing are or may be of any usual  
40 or known construction and operation.

Instead of the customary check-valve for admitting air into the casing there is accord-  
ing to this invention an air-inlet, of which the piston *c* forms the valve. Such an inlet is  
45 shown at *q*, which is arranged to be uncovered by the piston *c* as the latter moves upward, whereby the air is drawn from the atmosphere through the port *q* into the casing *c* behind the piston. On the downstroke of the

piston the port *q* is closed by the piston and 50 the air is compressed until the piston uncovers the by-pass *o*, when it rushes in above the piston and during alternate upstrokes of the piston aids the exhaust and during the other alternate upstrokes furnishes air for the proper 55 mixture of the charge. The amount of air drawn in by the piston through the inlet *q* may be regulated by means of the segment *r*, whose position across the inlet *q* may be varied by means of the screws *s*, which engages a threaded 60 hole in the wall of the channel *q* and swivels into the segment.

It will be noted that the intake *q* passes along the cylinder, so that the intaken air is warmed or heated by the hot cylinder before 65 it enters the crank-casing, whereby air is supplied for mixing with the charge at a higher temperature than is the case where the air is taken into the crank-casing directly from the atmosphere, thus conducing to better mixing 70 and more complete combustion, with consequent increase in economy. Again, it is noted that the speed at which the engine runs, other things being equal, depends upon the amount of air taken in at the port *q*, so that by vary- 75 ing said amount the speed of the engine may be regulated without varying the amount of fuel injected or taken into the cylinder, as actual practice shows.

What is claimed is— 80

1. In an internal-combustion engine, the combination of the cylinder and its piston, with a casing in which the piston compresses air, a by-pass connecting said casing-chamber and the cylinder, an air-inlet in the cylinder which 85 the piston covers and uncovers and through which air is drawn into said casing, means for regulating the amount of air drawn through said inlet, and means supplying fuel in invariable amount directly at the combustion end of 90 the cylinder whereby the speed of the engine may be regulated by varying said air-inlet.

2. In an internal-combustion engine, the combination of the cylinder and its piston, with a casing into which the piston draws and com- 95 presses air, a by-pass connecting said casing and the cylinder, an air-inlet lying against said cylinder, whereby the intaken air may be

heated, said inlet being covered and uncovered  
by the piston, means for regulating the amount  
of air drawn through said inlet, and means  
supplying fuel in invariable amount directly  
5 at the combustion end of the cylinder where-  
by the speed of said engine may be varied by  
regulating the amount of air taken in.

Signed at New York, in the county of New

York and State of New York, this 21st day of  
July, A. D. 1903.

NELSON L. TUCK.  
WILLIAM W. TUCK.

Witnesses:

FRANK RYALL,  
R. W. BARKLEY.