

H. T. BRUNS.
MULTICYLINDER INTERNAL COMBUSTION ENGINE.
APPLICATION FILED DEC. 23, 1909.

1,008,693.

Patented Nov. 14, 1911.

FIG. 1

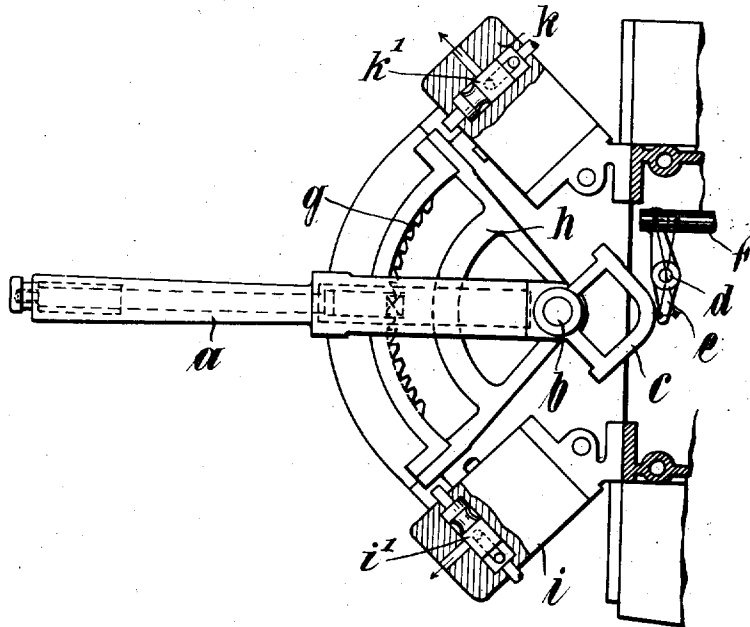


FIG. 2.



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UNITED STATES PATENT OFFICE.

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MULTICYLINDER INTERNAL-COMBUSTION ENGINE.

1,008,693.

Specification of Letters Patent. Patented Nov. 14, 1911.

Application filed December 23, 1909. Serial No. 534,589.

To all whom it may concern:

Be it known that I, HANS TH. BRUNS, a subject of the King of Prussia, residing at Nuremberg, in the Kingdom of Bavaria and German Empire, have invented new and useful Improvements in or Relating to Multicylinder Internal-Combustion Engines, of which the following is a specification.

This invention relates to an improved starting or operating device for multi-cylinder internal combustion engines.

The starting or operating device which is illustrated by way of example in the accompanying drawing serves for both starting and reversing.

Figure 1 shows the new device in side elevation, the starting lever occupying its central position, Fig. 2 is a detail of the toothed segment, adapted to cooperate with the starting lever.

The starting or operating device consists of the starting lever *a* displaceably mounted on a stud *b* and prolonged beyond the stud *b*. The extension *c* presents the form of a rocker or cam. One end of a lever *e* pivoted on a stud *d* bears against the rocker *c*, while the other end of this lever *e* is mounted on a rod *f* which constitutes a link for the fuel pump. In addition to the lever *a*, a toothed segment *g* is rockably mounted on the stud *b*. A guide *h* is provided on the carrier of the segment *g* to support and guide the lever *a* in its movements between the distributing blocks *i* and *k*. The latter inclose each a valve *i'*, *k'* for the control of the usual distributing members (valves) in the cylinder cover, the valve stems *l* and *m* respectively being operated by the segment *g* when moved in either direction by the lever *a*. The toothed segment *g*, an underneath view of which is shown in Fig. 2, presents two oppositely directed rows of teeth which meet each other at the middle. These rows of teeth lie in different vertical planes. The starting lever *a* is provided with suitable engaging members.

The operation is as follows:—When the engine is to be started the starting lever *a* is adjusted on the toothed segment *g*. Adjustment of the starting lever *a* on the toothed segment simultaneously entails displacement of the rocker or cam member *c* and consequently an adjustment of the fuel pump to a given supply. The drawing shows clearly that when the starting lever is at the middle of the toothed segment the end of

the lever *e* bearing on the rocker is depressed to its lowest point. If the rocker is rotated in one direction or the other, owing to its peculiar curvilinear form the end of the lever *e* will be lifted and the fuel pump thereby adjusted.

The lever is adjusted on the toothed segment in such a manner that by means of the rocker the fuel pump is caused to supply the necessary quantity of fuel for the desired power. The lever is then pushed toward the side on which it has been set over. Any pressure exerted on the lever must however simultaneously act upon the freely rocking toothed segment *g* in engagement with the lever. Owing to the shock imparted thereby to the toothed segment the latter actuates the distributing members in the distributing block, thereby controlling the supply of compressed air to the separate cylinders and starting the engine.

Assuming that the engine is running forward and that it is desired to reverse it; the starting lever is first of all set in the middle position; that is to say at the "stop" position. This cuts off the supply of fuel and the engine comes to rest. The lever is then brought to the other side of the toothed segment to such an extent that the supply of fuel is regulated. A blow against the lever in the direction in which the lever has been set over causes the movement transmitted to the toothed segment by the blow against the lever to actuate the distributing block for reversed running of the engine. Starting or reversing of the engine may also be effected before the admission or regulation of the fuel supply in the middle position of the starting lever or indeed from any other position. In this case, however, immediately after the starting or reversal the fuel pump must be adjusted. The toothed segment may also be immovably fixed. In this case the distributing blocks are operated by the starting lever directly.

Having thus described my invention, I declare that what I claim as new and desire to secure by Letters Patent is:—

1. In multi-cylinder internal combustion engines, the combination with separate distributing valves for controlling the compressed air for starting and reversing purposes, and fuel supply means, of a single lever, a rocking member connected therewith and adapted to control the said fuel supply means, an actuating member adapted to be

coupled with the said lever at any desired point of its range of movement and adapted to operate said distributing valves when coupled with said lever.

6 2. In multi-cylinder internal combustion engines, the combination with separate distributing valves for controlling the compressed air for starting and reversing purposes, and fuel supply means, of a single
10 lever, a rocking member connected therewith and adapted to control the said fuel supply means, and a toothed segment adapted to be coupled with said lever at any desired point of its range of movement and
15 adapted to operate said distributing valves when coupled with said lever.

3. In multi-cylinder internal combustion engines the combination with separate distributing valves for controlling the compressed air for starting and reversing purposes, and fuel supply means, of a single
20 lever, a rocking member formed integral therewith and adapted to control the said fuel supply means, and a connecting member adapted to rock about the fulcrum of
25 said lever and to be coupled therewith at any desired point of its range of movement, and to operate said distributing valves, when coupled with said lever.

30 4. In multi-cylinder internal combustion engines, the combination with separate dis-

tributing valves for controlling the admission of compressed air for starting and reversing purposes, and fuel supply means, of a single lever, a rocking member extending from said lever beyond its fulcrum and adapted to control the said fuel supply means, and a toothed segment, adapted to rock about the fulcrum of said lever and to be coupled therewith, so as to operate said distributing valves when coupled with said lever.

5. In multi-cylinder internal combustion engines, the combination with separate distributing valves for controlling the admission of compressed air for starting and reversing purposes, and fuel supply means, of a single lever, a rocker integral therewith and adapted to control said fuel supply means, and an independent actuating member comprising a toothed segment adapted to rock about the fulcrum of said lever and to be coupled therewith, so as to operate said distributing valves when coupled with said lever.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HANS THEODOR BRUNS.

Witnesses:

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CARL GARZ.