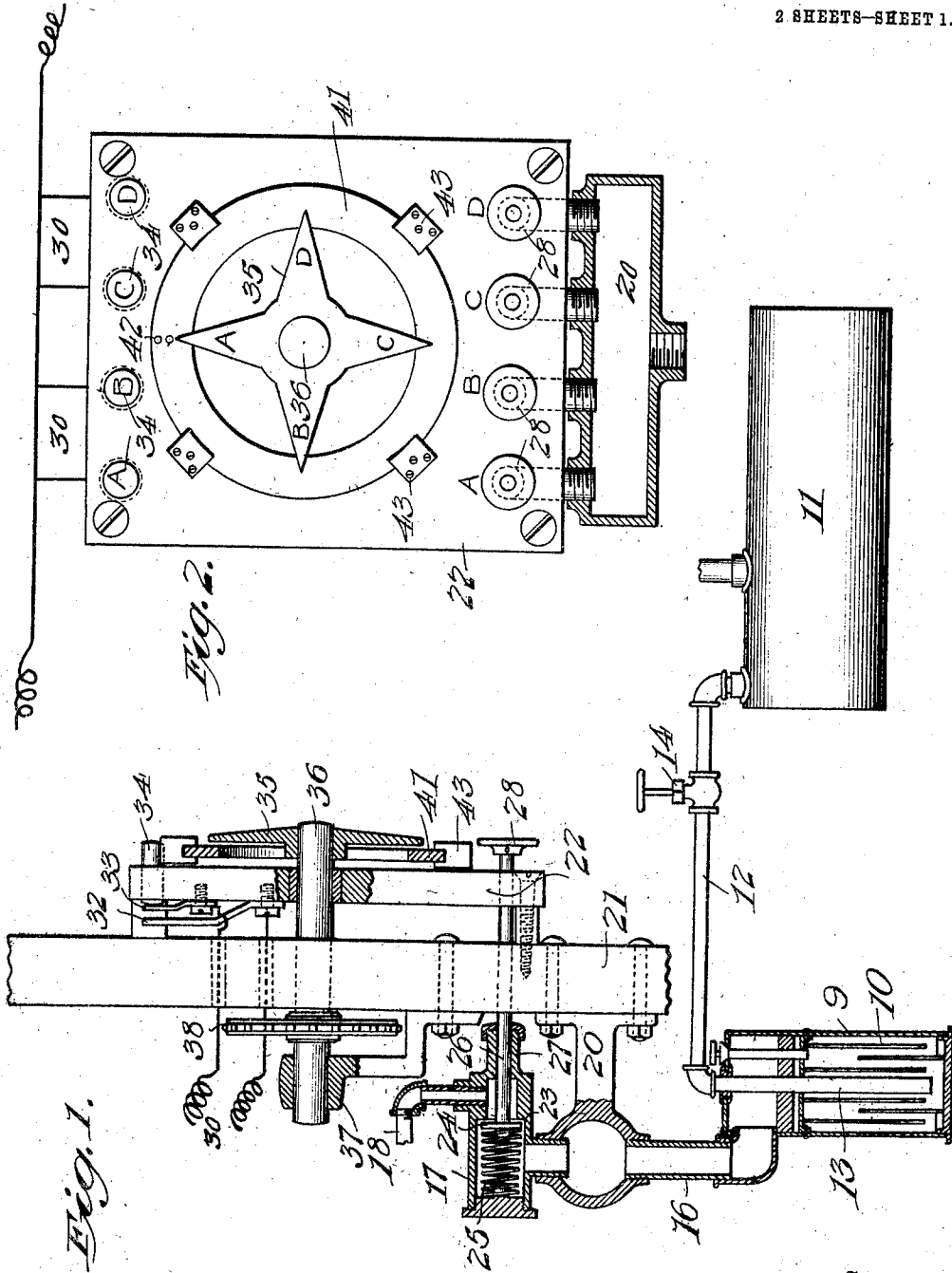


C. E. DANIELS & E. S. McNICHOLS.
GAS ENGINE STARTER.
APPLICATION FILED DEC. 27, 1909.

985,011.

Patented Feb. 21, 1911.
2 SHEETS—SHEET 1.



Witnesses

L. M. ...
Emory L. ...

Inventors
Charles E. Daniels
&
Ellsworth S. McNichols.

384

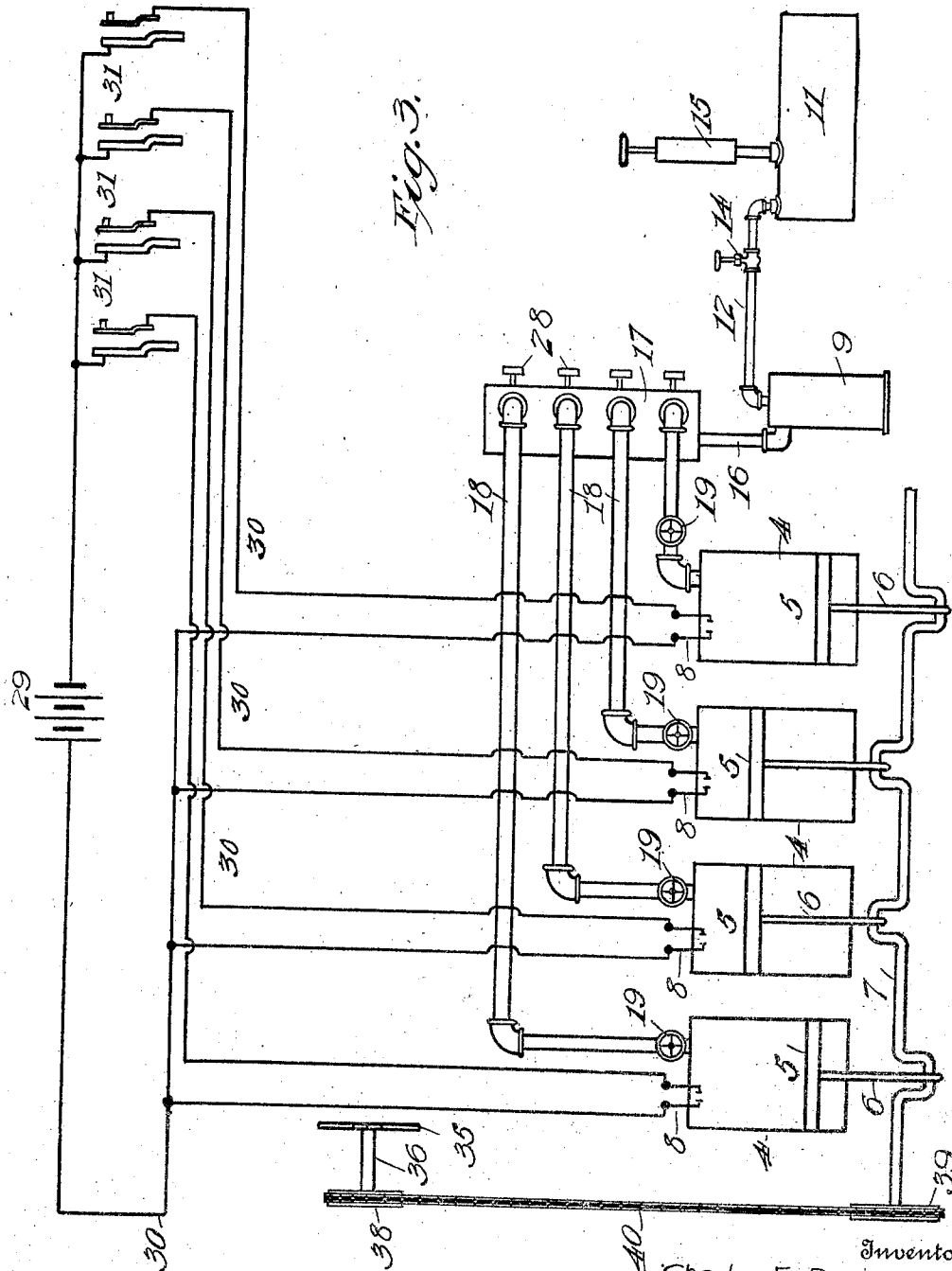
S. P. ...
Attorney

C. E. DANIELS & E. S. McNICHOLS.
GAS ENGINE STARTER.
APPLICATION FILED DEC. 27, 1909.

985,011.

Patented Feb. 21, 1911.

2 SHEETS-SHEET 2.



Witnesses
T. L. Moorman
Emory L. Groff

Inventors
Charles E. Daniels
&
Ellsworth S. McNichols

38y

S. B. Wharton
Attorney

UNITED STATES PATENT OFFICE.

CHARLES E. DANIELS AND ELLSWORTH S. McNICHOLS, OF ATCHISON, KANSAS.

GAS-ENGINE STARTER.

985,011.

Specification of Letters Patent.

Patented Feb. 21, 1911.

Application filed December 27, 1909. Serial No. 534,975.

To all whom it may concern:

Be it known that we, CHARLES E. DANIELS and ELLSWORTH S. McNICHOLS, citizens of the United States, residing at Atchison, in the county of Atchison and State of Kansas, have invented certain new and useful Improvements in Gas-Engine Starters, of which the following is a specification.

The present invention relates more particularly to means for starting explosive engines, particularly those of the multiple cylinder type without the necessity of cranking, or employing other similar mechanical devices for initiating the movement of the engine.

The primary object of the invention is to provide a compact, simple and effective system, by means of which an engine can be started with ease and expedition, the mechanism being so arranged and grouped that it can be readily understood, and is at all times entirely accessible.

The preferred form of construction is shown in the accompanying drawings, wherein:—

Figure 1 is a view partly in elevation and partly in section of the principal portion of the mechanism. Fig. 2 is a face view of the supporting plates and the elements associated therewith. Fig. 3 is a diagrammatic view of the system.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

As already stated, the apparatus is particularly designed for use in connection with a multiple cylinder explosive engine, and in Fig. 3, such an engine is shown diagrammatically, the same having four cylinders 4, in which operate reciprocating pistons 5 connected by pitmen 6 with an engine shaft 7. Each cylinder is provided with the usual mechanism for controlling the supply and exhaust from the cylinders, which mechanism is, however, not shown in order to avoid confusion. Furthermore, each of the cylinders has an igniter 8 that may be of any well known type.

In the present invention there is employed in connection with this engine, a supplemental charge-forming device or carbureter 9 having baffle plates 10 therein, and arranged to receive a supply of gasoline or other suitable charge-producing fuel. A reservoir 11 for air under pressure is likewise provided, and has a pipe 12 leading

therefrom and depending in the carbureter 9, as shown at 13. A valve 14 is preferably located in the pipe 12. This reservoir 11 receives its supply from any suitable source, as for instance, a pump 15 connected thereto, which pump may be operated by hand, or by any other desired agency.

Extending from the carbureter 9 is a charge-supply pipe 16 that leads to a distributing chamber or box 17. From this box extend a plurality of branch pipes 18 that are connected to the different cylinders, as shown in Fig. 3, and have suitable check valves 19 located adjacent to said cylinders. The distributing chamber 17 is preferably supported by a hollow coupling bracket 20 secured to the dashboard 21 or other suitable part of the apparatus associated with the engine, and fastened to the opposite side of this dashboard is a supporting plate 22 that is preferably spaced from the dashboard, as shown in Fig. 1. The inlets to the branch pipes 18 are surrounded by shoulders 23 constituting valve seats, with which co-operate valves 24 that are located in the distributing chamber and are normally held to said seats by coiled springs 25. These valves have actuating stems 26 that pass through suitable packing glands 27 formed on the distributing chamber, and said stems project through the lower portion of the plate 22, being provided on their projecting ends with actuating knobs 28.

Means, auxiliary to the ordinary actuating means for the igniters is also employed. Thus, as shown diagrammatically in Fig. 3, a suitable source of electrical energy is designated 29, which may be that employed in the ordinary operation of the igniters, this source being in a plurality of auxiliary circuits 30 connected respectively to the different igniters, and having therein individual circuit closers 31 that are mounted on the rear side of the supporting plate 22, and comprise stationary brackets 32 and spring elements 33 movable into and out of engagement with the brackets. Individual push buttons 34, slidably mounted in the upper portion of the supporting plate, constitute means for moving the spring elements 33 into engagement with the bracket elements 32 to close the circuits.

There is also employed in the mechanism, an indicator to show the position of the different pistons of the cylinders. As is well known to those skilled in the art, the cylin-

ders are usually fired in the order of 1, 3, 4, 2, and in order to show which cylinder of the engine is at or near the firing point, a rotary pointer 35 is employed that is carried by a shaft 36 journaled in the supporting plate 22, and in a bracket 37 secured to the rear side of the dashboard, this pointer having as many terminals as there are cylinders to the engine, and each being appropriately designated. The shaft 36 is suitably geared to the engine shaft so as to rotate therewith. Thus in the present embodiment, said shaft has a sprocket wheel 38, and the engine shaft as shown diagrammatically in Fig. 3, has a corresponding sprocket wheel 39. A sprocket chain 40 passes around, and thus transmits motion from one sprocket wheel to the other. There is mounted on the outer face of the supporting plate 22, an adjustable ring 41 that is provided with an indicating element 42. The ring can be clamped against rotation and in different adjusted positions by the clips 43.

The operation of the apparatus is substantially as follows: Assuming the engine at a standstill, it will be obvious that one of the pistons will have just passed over the center, while another will be just starting on the compression stroke. If now, the valves 24 controlling the branches which supply the cylinders of these particular pistons with charges are opened, it will be evident that gas under pressure will be introduced thereinto, inasmuch as the compressed air in the reservoir 11 will pass through the carbureter and discharge through the branches into said cylinders. Moreover, the particular cylinders to be charged, can be readily ascertained by an inspection of the indicator. Having now charged the two cylinders, the one that has just passed its center is fired by pressing the proper push button, which is also designated, as shown. This explosion starts the engine, and the second cylinder being also charged, the charge therein will be compressed, and the igniter, which will automatically operate when the engine becomes started, will explode this second charge. From then on, the engine will operate.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of con-

struction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is:—

1. The combination with a multiple cylinder explosive engine, of an igniter for each cylinder, an auxiliary charge supply, a pipe leading therefrom and having a distributing chamber, a plurality of branches leading from the distributing chamber to the different cylinders, a plurality of manually operated valves located in the chamber and respectively controlling each branch, an individual operating device for each valve, and auxiliary means for operating the igniters.

2. The combination with a multiple cylinder explosive engine, of an igniter for each cylinder, a charge supplying means including a pipe having a distributing chamber, a plurality of branch pipes leading from the distributing chamber to the different cylinders, a plurality of spring closed valves located in the distributing chamber, and each having an individual actuating device, auxiliary means for operating the igniters including separate circuit closers for each igniter and individual operating devices for each circuit closer, and an indicator operated by the engine.

3. The combination with a multiple cylinder explosive engine, of an igniter for each cylinder, a supporting plate, a rotary indicator mounted thereon and driven by the engine, a charge forming device, a reservoir for air under pressure connected thereto, a pipe leading from the charge-forming device and having a distributing chamber, branches leading from the distributing chamber to the cylinders, a plurality of valves controlling the branches and having independent actuating devices mounted on the supporting plate, and means for operating the igniters including a circuit closer for each mounted on the supporting plate, and an individual actuating device for each circuit closer likewise mounted on said plate.

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

CHARLES E. DANIELS.
ELLSWORTH S. McNICHOLS.

Witnesses:

Z. E. JACKSON,
CORA N. TERRY.