No. 675,348. Patented May 28, 1901.

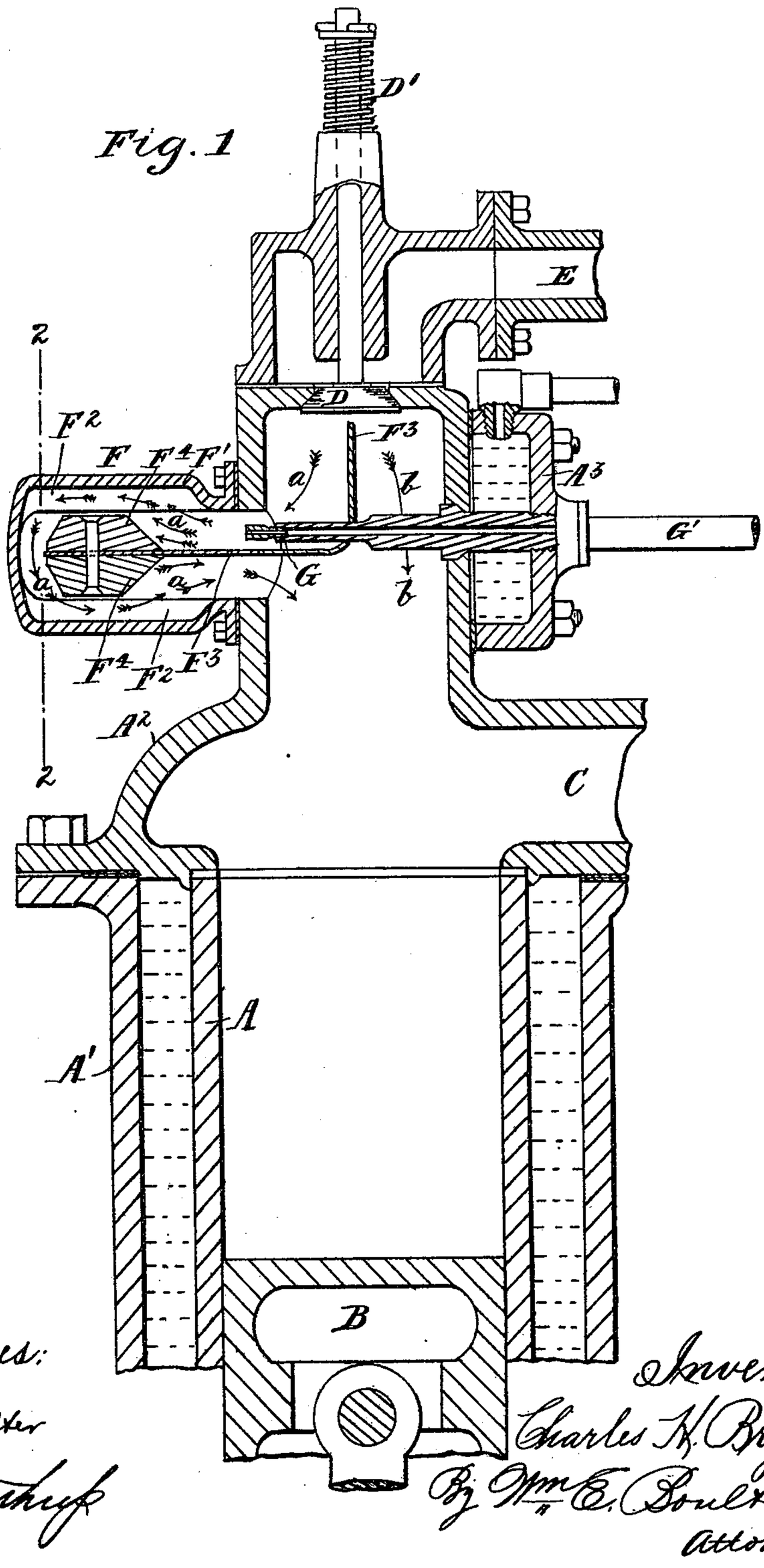
C. H. BRYANT.

CHARGE MIXER FOR INTERNAL COMBUSTION ENGINES.

(Application filed Aug. 23, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1



Witnesses:

H. K. Boulter

C. F. Monkhouse

Inventor:

Charles H. Bryant,

By Wm E. Boulter,

Attorney.

No. 675,348. Patented May 28, 1901.

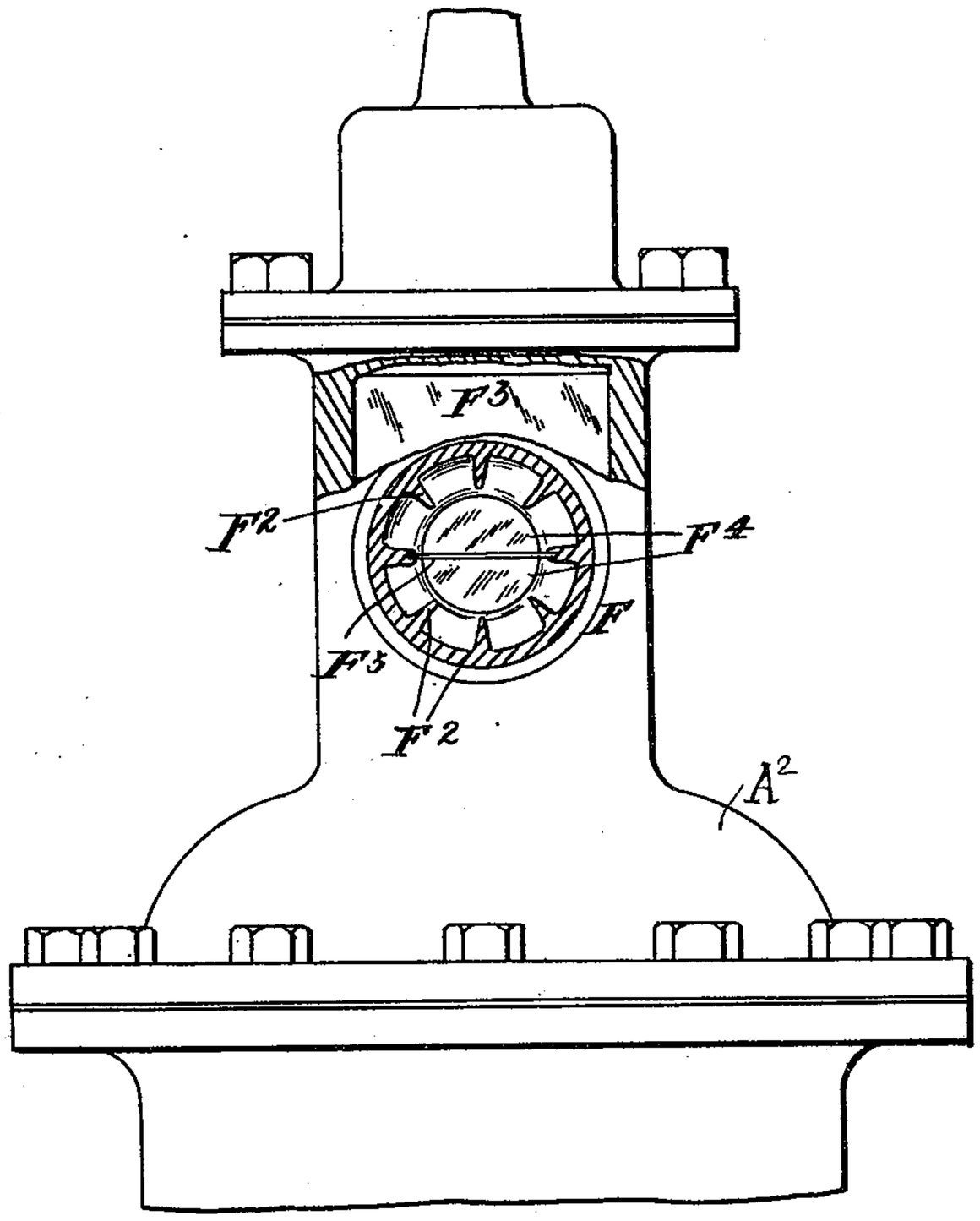
C. H. BRYANT.

CHARGE MIXER FOR INTERNAL COMBUSTION ENGINES.

(Application filed Aug. 23, 1898.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 2.



Witnesses:
H. K. Boulter
C. L. Northrup

Inventor.
Charles H. Bryant,
By Wm E. Boulter,
attorney

UNITED STATES PATENT OFFICE.

CHARLES HENRY BRYANT, OF LONDON, ENGLAND, ASSIGNOR TO JOHN FORREST WALTERS, OF TWICKENHAM, ENGLAND.

CHARGE-MIXER FOR INTERNAL-COMBUSTION ENGINES.

SPECIFICATION forming part of Letters Patent No. 675,348, dated May 28, 1901.

Application filed August 23, 1898. Serial No. 689,340. (No model.)

To all whom it may concern:

Be it known that I, CHARLES HENRY BRYANT, engineer, of Chiswick Mall, London, Middlesex county, England, have invented certain new and useful Improvements in or Relating to Internal-Combustion Engines, (for which application has been made in England, No. 27,484, dated November 23, 1897,) of which the following is a specification.

This invention relates to internal-combustion engines, and has particular reference to the ignition of the explosive charge.

In engines constructed according to this invention the ignition of the charge is effected by the meeting under compression and without intimate mixture of ordinary air and air heavily charged with a hydrocarbon oil or other fuel.

The practice up to the present in the design of oil-engines has been to imitate as far as possible the conditions which obtain in the ordinary gas-engine—that is to say, the oil is vaporized and intimately mixed with atmospheric air in order to produce an explosive mixture. The lighter oils naturally lend themselves to this mode of treatment better than the heavier hydrocarbons, one of the chief difficulties with the latter being that the combustion is incomplete, and consequently a considerable deposit is formed in the cylinder and combustion-chamber. In oil-engines working upon these old lines it is necessary to employ a very high temperature to obtain complete vaporization of the oil, and reliable ignition can as a rule only be obtained by the use of an electric spark or incandescent igniting device. The action which takes place in my engine is quite different from this, for instead of seeking to obtain an intimate mixture which upon ignition produces a sudden explosion I bring a body of air which has been saturated with hydrocarbon—ordinary petroleum, for instance—into frictional contact with another body of pure air. Such contact under a low compression and at a comparatively low temperature has been found to result in a slow combustion, not a sudden explosion, and thus the energy derived from the gas is regularly imparted to the piston during the time occupied by the stroke. Moreover, the combustion of the hydrocarbon is complete, there being practically no deposit in the combustion-chamber or cylinder. Consequently a heavy hydrocarbon oil can be used.

It is to be understood that no "vaporizer," in the ordinary sense of the word, is employed in my engine—that is to say, the oil is not brought into contact with any incandescent or even red-hot body in order to vaporize it. All that is required is a pulverizing or mixing chamber wherein air may be saturated with finely-divided oil, and this saturation may be, and preferably is, largely mechanical, although assisted by heat.

The ignition, produced, as stated above, by frictional contact between the two bodies, is aided by the compression and naturally starts at the hottest point, which is the pulverizing-chamber. It is found that when the amount of compression and the quantity of oil admitted at each charge have been regulated the engine will run with extreme precision and regularity, and premature ignition—a very common fault in the older forms of oil-engines—is practically absent. This is no doubt due to the low temperature at which the engine works.

In order that the details of construction of my engine may be clearly understood, I will proceed to describe the same specifically, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section of a portion of one construction of engine according to this invention, and Fig. 2 is an elevation at right angles to Fig. 1 and partly in section on the line 2 2 of that figure.

Like letters indicate like parts throughout the drawings.

A is a cylinder, jacketed, as at A′, and having an upper portion or extension A^2, which serves as a combustion-chamber. B is the piston, C is the exhaust-outlet, and D is the air-inlet valve, spring-controlled, as at D′. The air-inlet valve operates in the upper part of the combustion-chamber A^2, air being admitted to the back of the valve through the pipe E.

Upon one side of the combustion-chamber A^2 a pulverizer F is provided. It comprises a hollow vessel F′, provided with internal ra-

diators F^2 and divided for a portion of its length by a diaphragm F^3, this diaphragm extending into the upper part of the combustion-chamber A^2 and being bent upward below the air-inlet valve D. Baffle-blocks F^4 are mounted upon the diaphragm F^3 inside the pulverizer F, and an oil-inlet nozzle G is passed through the upturned end of the diaphragm F^3, so that oil which is pumped through the pipe G′ issues from the nozzle G and impinges upon the baffle-blocks F^4, thus being very finely divided or pulverized. The oil is introduced at the same time that air is drawn in through the inlet-valve D. The oil-inlet pipe G′ may conveniently pass through a water-jacket, as at A^3, and this jacket A^3 may be in communication by means of a suitable pipe with the jacket A′ of the cylinder A.

It is to be understood that the accompanying drawings show merely the general arrangements of the engine and not the precise dimensions or proportions of the various parts.

The operation of this engine is as follows, assuming it to be adapted to work upon the Otto cycle: Combustion having taken place, the piston B is urged downward and returns, sweeping out the products of combustion through the exhaust-opening C. Upon its next downstroke air is drawn in through the air-inlet valve D and is divided into two portions by the upturned end of the diaphragm F^3. One portion passes around the pulverizer F, as indicated by the arrows *a*, Fig. 1, taking up on its way its charge of oil, which is injected through the nozzle G. It then passes down into the cylinder A. The other portion of the air passes upon the other side of the diaphragm F^3 straight into the cylinder A, as shown by the arrow *b*, Fig. 1. These two portions do not intimately mix. Upon the next upstroke of the piston B the two portions of the charge are compressed into the chamber A^2 and combustion takes place where they meet in the pulverizer F. Under the action of the ignited charge the next working outstroke of the piston B takes place, and the operation is repeated. To start the engine, the pulverizer is preferably heated to a slight extent, which may be done in any convenient manner; but, if desired, the engine may be started by merely turning it without applying heat to the pulverizer.

It is to be understood that the operation of charging part of the air with the fuel as carried out by the pulverizer is largely mechanical, although it is assisted by the limited heat.

Although the use of oils, and particularly heavy oils, has been mentioned, it is to be understood that other materials sufficiently rich in carbon may be used—such, for example, as acetylene or oil gas or other explosive mixture. Coal-dust may also be employed. Modifications in the constructional details may be made to suit the various kinds of fuel.

I claim—

A combustion-chamber having an air-inlet at one end and a laterally-projecting mixing-chamber, a bent plate having one limb lying axially of the combustion-chamber and the other in the center of the mixing-chamber, ribs on the walls of the mixing-chamber and baffles on the plate and an oil-pipe extending across the combustion-chamber into the mixing-chamber.

In witness whereof I have hereto set my hand in the presence of the two subscribing witnesses.

CHARLES HENRY BRYANT.

Witnesses:
HAROLD WADE,
HARRY B. BRIDGE.