No. 865,135. PATENTED SEPT. 3, 1907.

B. L. TOQUET.

INTERNAL COMBUSTION MOTOR.

APPLICATION FILED JAN. 6, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

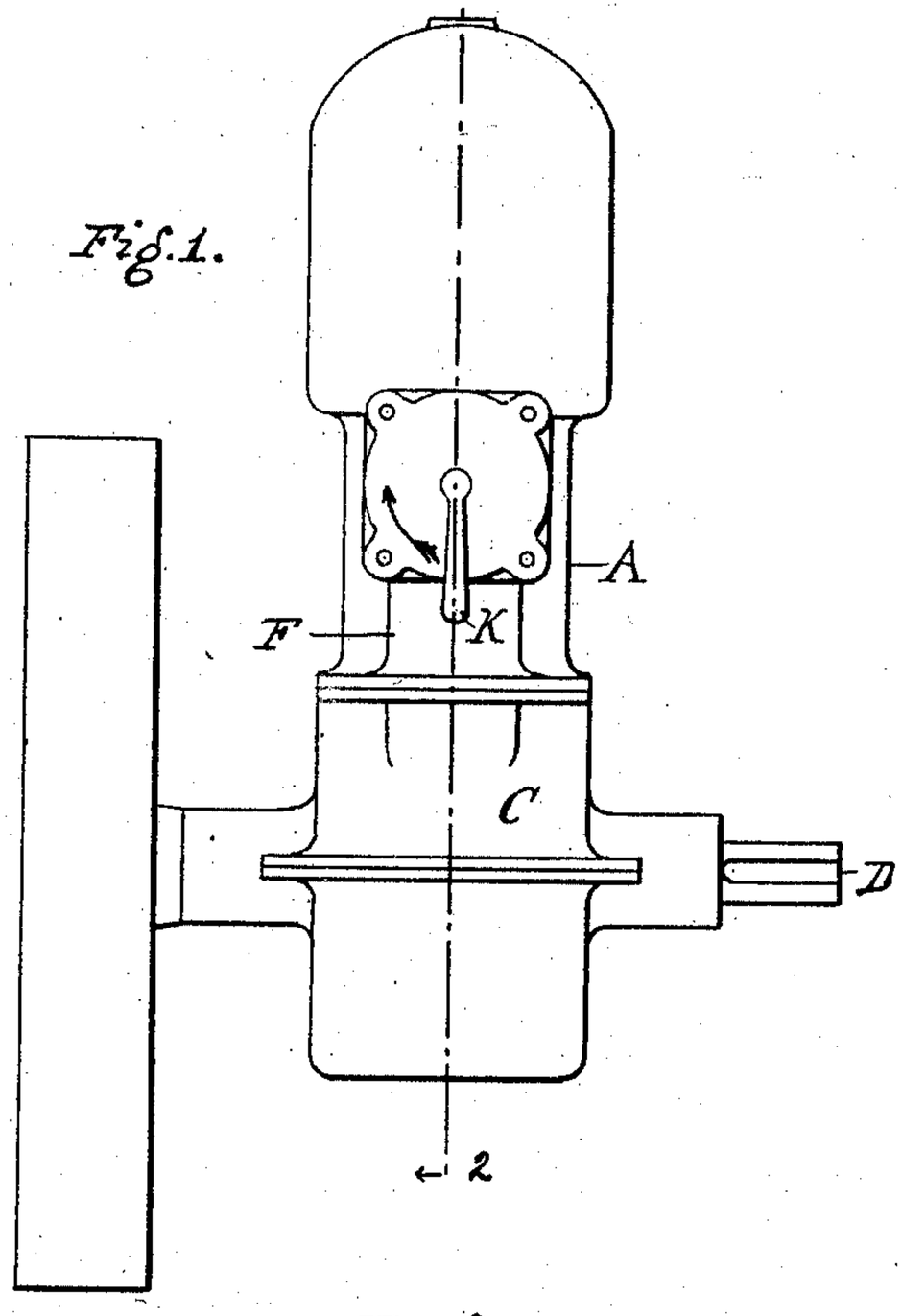


Fig. 2.

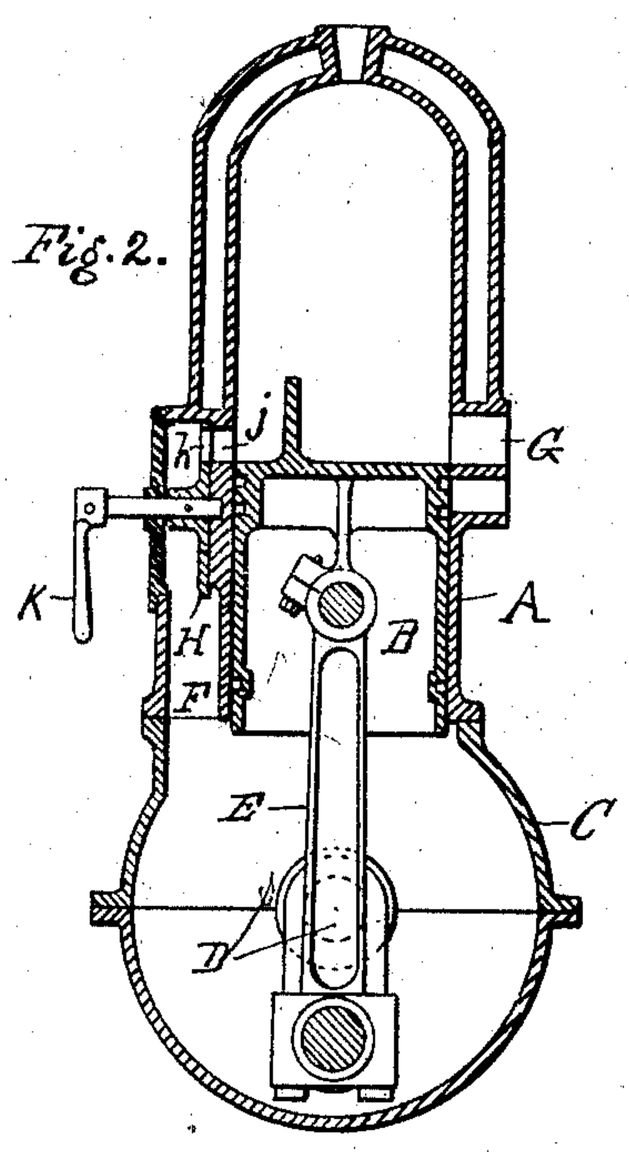


Fig. 3

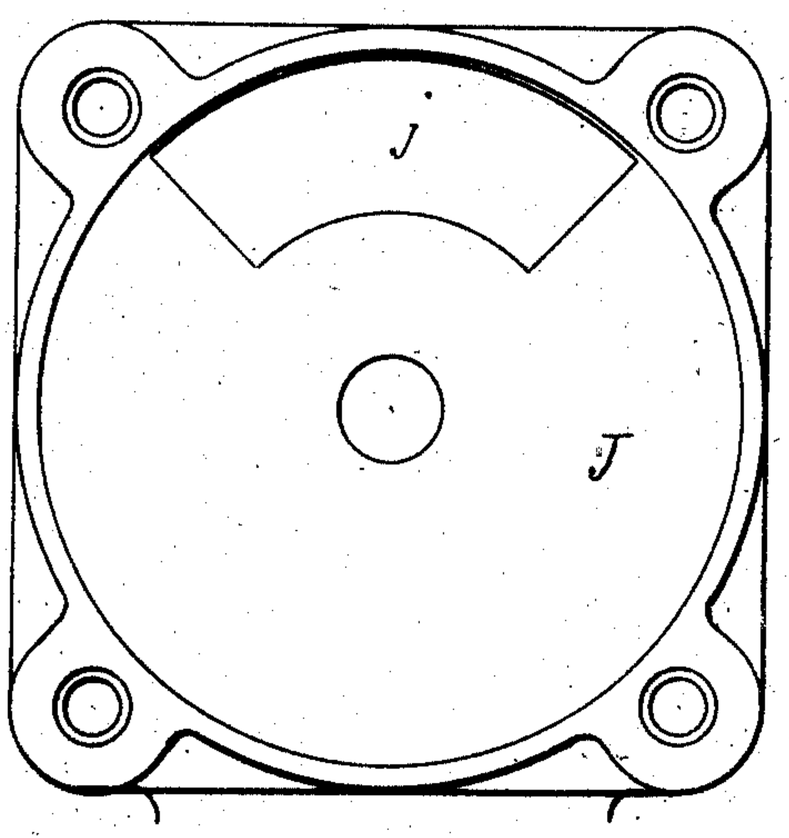
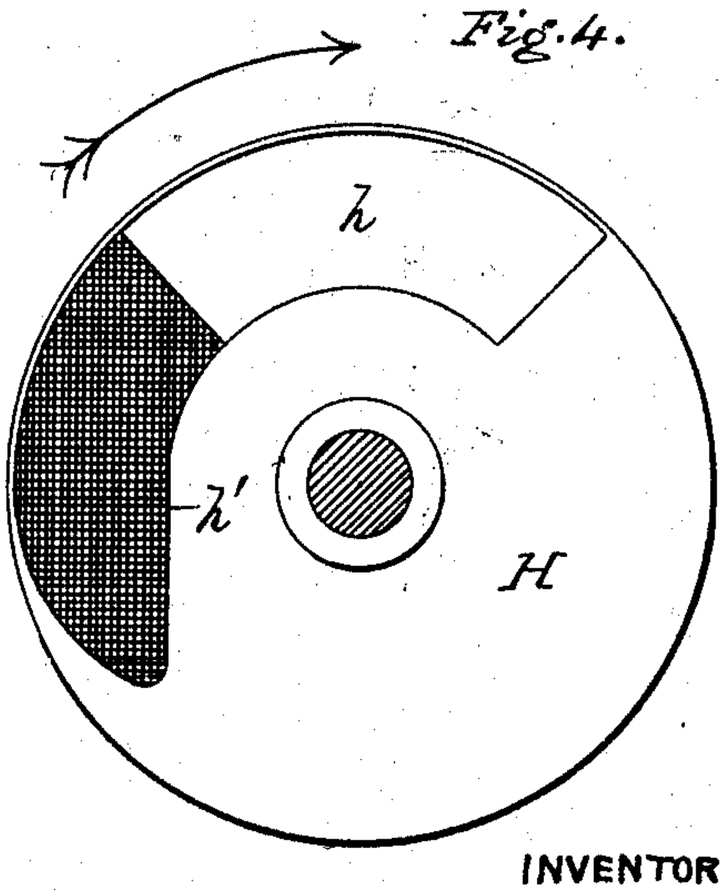


Fig. 4.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 5.

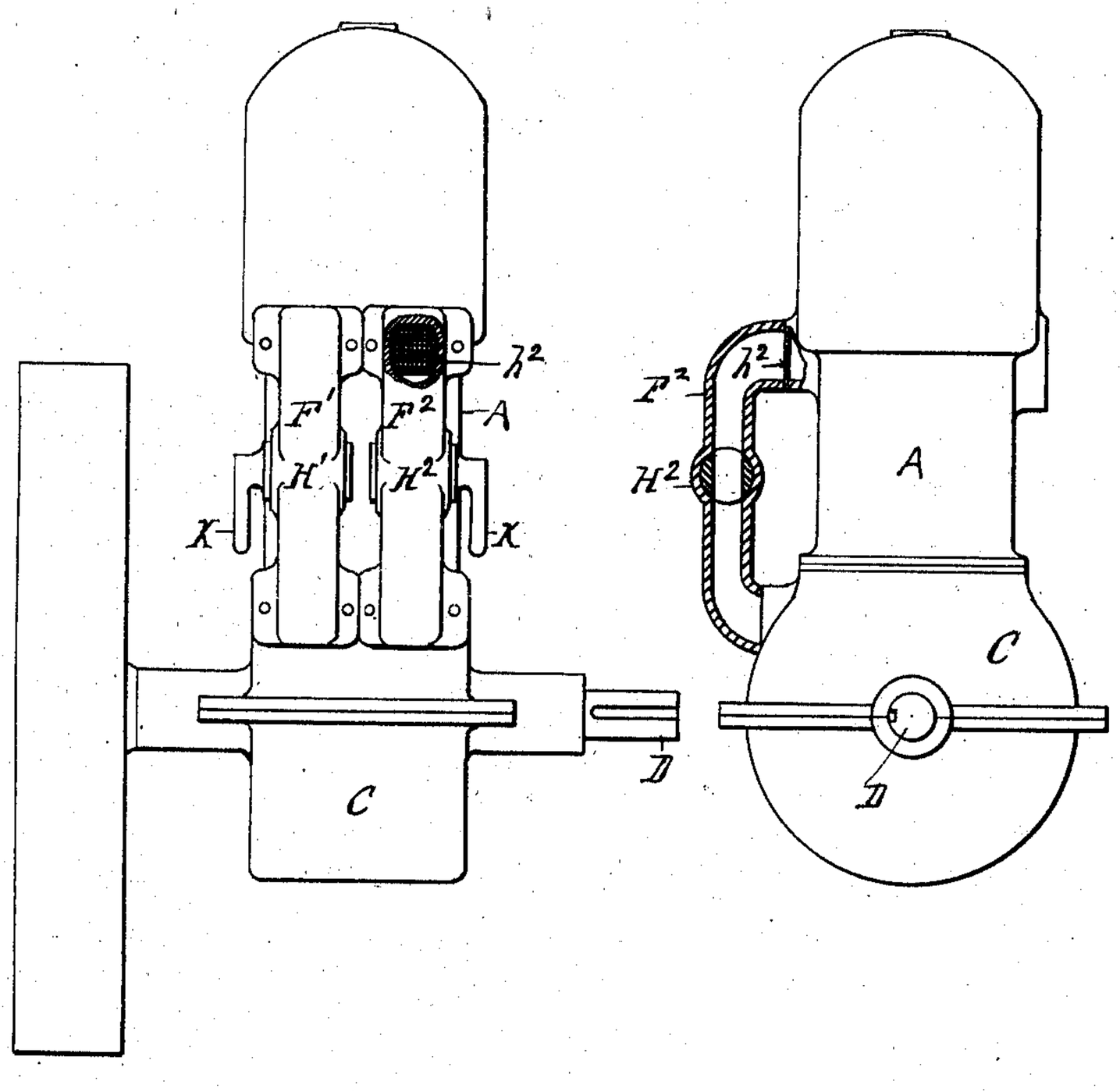

Fig. 6.

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UNITED STATES PATENT OFFICE.

BENJAMIN LOUIS TOQUET, OF WESTPORT, CONNECTICUT.

INTERNAL-COMBUSTION MOTOR.

No. 865,135. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed January 6, 1906. Serial No. 294,960.

To all whom it may concern:

Be it known that I, BENJAMIN LOUIS TOQUET, a citizen of the United States of America, residing in Westport, in the county of Fairfield, State of Connecticut, have invented certain new and useful Improvements in Internal-Combustion Motors, of which the following is a specification.

My invention relates more particularly to two-cycle gas engines or internal combustion motors, and the object of my invention is to so construct such an engine or motor as to prevent "back fire" or explosions in the crank case or supply chamber and so to render such engines or motors more suitable for use in automobiles. Most motors of this type utilize the crank case and piston as a pump with which to supply the explosion chamber with the explosive mixture. On its up-stroke the piston creates a partial vacuum in the crank case. This vacuum draws the explosive mixture into the crank case through a check valve or through a port so located as to prevent the mixture from blowing back. On its down-stroke the piston compresses the mixture to some extent and when the by-pass opens, the mixture rushes up into the explosion chamber. If any traces of flame or fire left over from the last explosion are present in the explosion chamber when the mixture rushes in, the latter is instantly ignited, and the flame rushes down the by-pass and explodes the mixture in the crank case. This explosion is practically instantaneous and sometimes passes up again through the by-pass and explosion chamber and out through the exhaust port, making a very objectionable noise. At other times it is caught in the crank case by the closing of the by-pass and expends itself against the side walls and piston. In the latter case it is apt to do damage, especially to crank shafts upon which two or more cylinders are used. Attempts have been made to prevent such back firing by introducing into the by-pass such a screen of fine wire gauze as is used in miners' safety lamps for a similar purpose. While this screen prevents back explosions it also prevents the free passage of the explosive mixture, particularly at high speed. The by-pass is open for a very short period at the end of the stroke, and therefore there is but little time for the mixture to pass. In a motor of ordinary design running at full speed, the total time of opening might not exceed 1/54th of a second. This, together with the fact that the crank case pressure seldom exceeds 10 pounds, means that even if the by-pass is free from all obstructions, the whole charge cannot pass through and that any obstruction whatever must necessarily cause a serious loss of power. It is a well known fact that a gas will pass more readily through one big opening than it will through a number of small ones, even if their combined area be equal to the large one; and therefore there is necessarily a loss of power when the by-pass is obstructed by a wire screen.

I so combine the screen with a valve that the explosive mixture will have a clear and unobstructed passage to the motor cylinder when working on full speed, but the mixture will be compelled to pass through the screen more or less when throttled.

In the accompanying drawings: Figure 1 is an exterior elevation of a gas engine embodying my invention: Fig. 2 is a vertical section on the line 2—2, Fig. 1; Fig. 3 is an enlarged face view of the throttle valve seat in the by-pass; the valve and cover plate having been removed; Fig. 4 is a rear view of the valve; and Fig. 5 is a front elevation, and Fig. 6 an end elevation of a modification.

Referring to Figs. 1 to 4, A is the working cylinder of a two-cycle gas engine; B is the piston; and C is the crank case with crank shaft D and connecting rod E. The by-pass, which forms the connection between the crank case and working chamber is shown at F, while the exhaust port is indicated at G. Within the by-pass, I provide a throttle valve H in the form of a disk, Figs. 2 and 4, adapted to a seat J (Fig. 3) and capable of being operated by a turning motion by means of a lever K. The valve has an opening *h*, which extends around an arc of say about 180° and this opening is partly covered by gauze h^1. The clear opening left in the disk valve is made about equal to the size of the port *j*, Fig. 3, leading to the working cylinder. When this clear opening in the valve registers with the port *j*, as intended to be indicated in Figs. 1 and 2, there is a clear opening from the crank case supply chamber to the working cylinder. When the valve is rotated 90° in the direction of the arrows, Figs. 1 and 4, the passage at the port *j* will be covered by the gauze h^1. If the valve be turned 90° further, the throttle will be entirely closed.

To make the utility and value of my invention more clear, it may be worth while to mention some of the causes of explosions in crank cases or other supply chambers. The primary cause is of course the presence of fire in the explosion chamber when the by-pass opens. This fire is left over from the previous explosion, and its presence may be due to any of several causes. If too little gasolene is admitted at the carbureter the mixture will be thin and burn slowly, thus causing crank case explosions at comparatively slow speed. If the motor is permitted in such a case to run free without load and with throttle partly open it will attain a speed which allows the fire no time to get out of the exhaust port. If an attempt is made to throttle it, the quantity of mixture is so small that it burns slowly. If, however, the mixture is good and the motor has a very small fraction of its normal load to carry, it may be controlled by the throttle quite as effectively as can one of the four-cycle type. If it has its full load it will never fire back to the crank case so long as the mixture is anywhere near right. It may even be

run far above its normal speed with throttle wide open and a light load; but when all load is taken off crank case explosions will follow if not stopped by the gauze screen.

From the above it will be seen that when the load is off the screen is essential; when the load is light, enough gas will pass through a small portion of screen. As the load becomes greater more of the screen will come into use and its full area will give considerable power. At this point the motor will be getting enough gas to insure good ignition and if more power is needed, the throttle may be safely opened until the gauze swings out of the way and the full clear opening is available for the passage of the gas.

The operation of the device will be clearly understood from the foregoing explanation. It should be understood, however, that while I prefer the construction hereinbefore described, I do not limit myself thereto, as the invention is suceptible of considerable modification. By way of example, I have shown in Figs. 5 a..d 6 one modified form, in which my invention may be embodied. In that modification, I have provided two by-passes F^1 and F^2, each provided with a valve H^1 (H^2). In one only of the by-passes I provide a screen, as at h^2. Thus the explosive mixture may be allowed to pass through the clear by-pass or through the screened by-pass, or partly through each or be wholly cut off.

I claim as my invention

1. The combination in an internal combustion motor, of a working cylinder, a chamber to supply the explosive mixture to the working cylinder, connecting means between the cylinder and the chamber, and a screen and valve means whereby the explosive mixture is directed either wholly or partly through the screen or clear of it.

2. The combination in a two-cycle internal combustion motor, of a working cylinder, a crank case, connecting means between the crank case and cylinder and a screen and valve means whereby the explosive mixture is directed either wholly or partly through the screen.

3. The combination of the working chamber of a two-cycle internal combustion motor with a crank case and connecting by-pass and a valve in the by-pass having a clear passage and carrying a screen, whereby, on movement of the valve, the explosive mixture may be directed either through the screen or through the clear passage or through both for the purpose set forth.

4. The combination of the working chamber of a two-cycle internal combustion motor with a crank case and connecting by-pass, and a valve in the by-pass having an opening and a screen partly closing said opening, for the purpose set forth.

5. The combination in an internal combustion motor, of a working cylinder, a chamber to supply the explosive mixture to the working cylinder, connecting means between the cylinder and the chamber, and a screen and means whereby the explosive mixture is directed either wholly or partly through the screen or clear of it.

6. The combination in an internal combustion motor, of a working cylinder, a chamber to supply the explosive mixture to the working cylinder, connecting means between the cylinder and the chamber, and a movable screen whereby the explosive mixture is directed either wholly or partly through the screen or clear of it.

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

BENJAMIN LOUIS TOQUET.

Witnesses:
WALTER R. BEACH,
HUBERT HOWSON.