

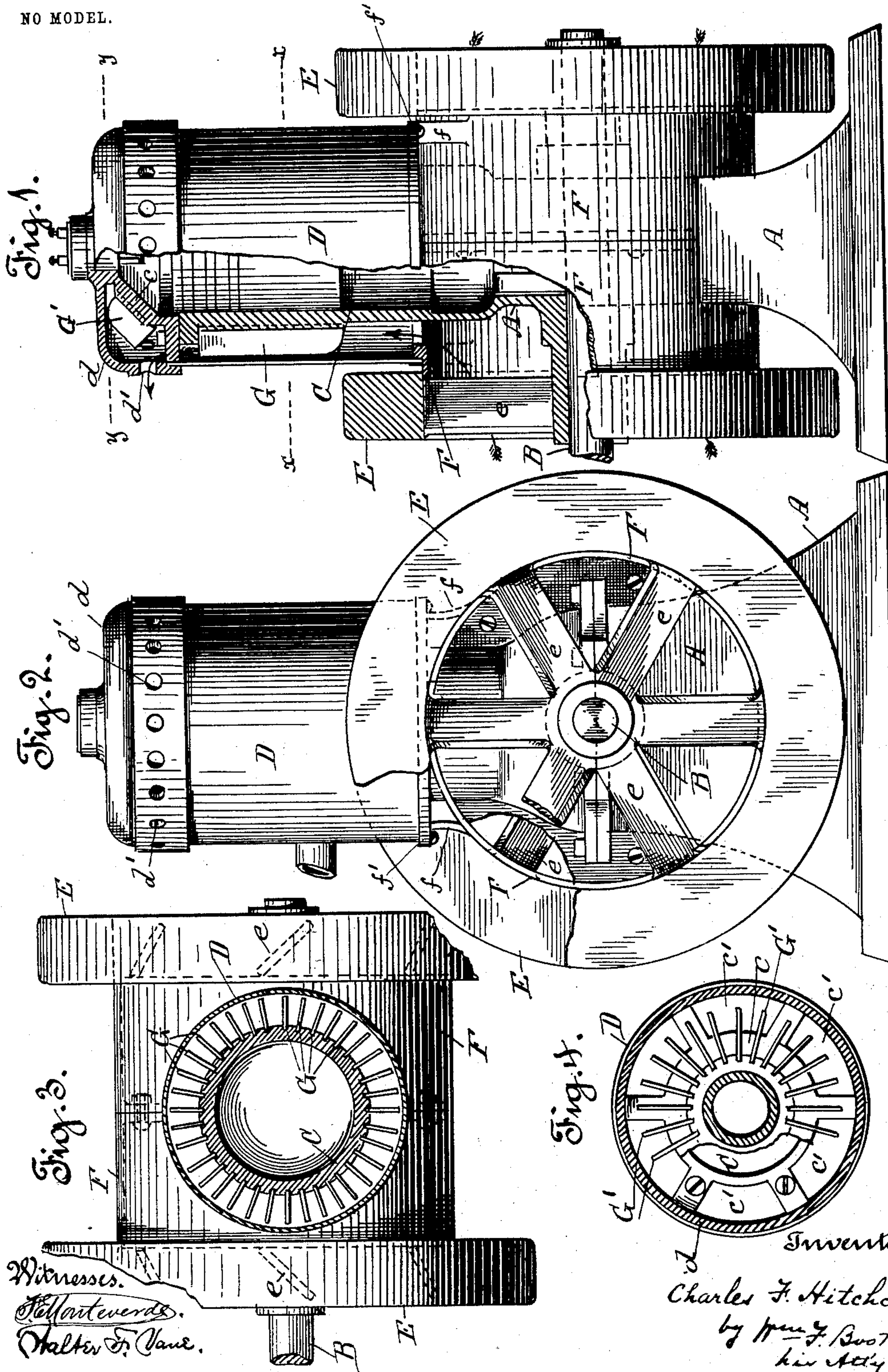
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C. F. HITCHCOCK.
COOLING MEANS FOR GAS ENGINES.

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NO MODEL.



UNITED STATES PATENT OFFICE.

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COOLING MEANS FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 737,737, dated September 1, 1903.

Application filed January 2, 1902. Serial No. 87,998. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. HITCHCOCK, a citizen of the United States, residing at Oakland, county of Alameda, State of California, have invented certain new and useful Improvements in Cooling Means for Gas-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to the class of gas-engines, and particularly to means employed to keep the cylinders of such engines cool. Such means in practice proceed upon several lines and include water-jacketing, cooling by means of a current of air directed against the outer surface of the cylinder, and cooling by increasing the radiating-surface of the cylinder by means of fins or ribs cast upon its outer surface. In my invention I employ both an air-current and an increased radiating-surface; and the objects I have in view are to secure in practical form a very large radiating-surface, which is rendered efficient by the application thereto in economical manner of a current of air.

To these ends my invention consists in the novel radiating-surface of the cylinder, the novel means for inducing the air-current, and the novel means for directing and applying said current to the cylinder-surface, all as I shall hereinafter fully describe.

Referring to the accompanying drawings, Figure 1 is a front elevation, partly broken, of the engine. Fig. 2 is a side view of same, partly broken. Fig. 3 is a section on line *xx* of Fig. 1. Fig. 4 is a section on line *yy* of Fig. 1.

A is the frame, B is the crank-shaft, C is the cylinder-body, and *c* the cylinder-head, of a gas-engine. Fitted around the cylinder-body is a sheet-metal jacket D, which is separated from it, thereby forming a circumscribing space or passage. This space or passage communicates at its upper end with a space circumscribing the cylinder-head *c*, said latter space being formed by the head, cap, or jacket *d*, the communication of the two spaces being through the cut-out portions *c'* in the cylinder-head. These two passages or spaces are practically a single continuous

space or passage circumscribing the cylinder, which cylinder may be regarded as including both the body thereof and the head. The circumscribing passage or space of the cylinder-body is open below, so that a current of air may be caused to flow through said passage or space from below and entering the space around the cylinder-head may be discharged through a series of openings or exits *d'* in the cap or jacket of said head.

The current of air, though it may be induced by any suitable means, is best created by fans driven by the engine. The best form of these fans is by making radial blades *e* in one or in both fly-wheels E, thereby causing the fly-wheels to serve as the blowers to create and force the current of air upon the cylinder-surface, both of body and head. The blades *e* will be set at the proper angle to draw the air inwardly—that is, toward the engine. Suitable means for directing the air-current thus induced to the circumscribing space of the cylinder are employed. A practical means is a housing formed by two annular flanges or cylinders F. The outer edge or rim of these flanges fits just under the rim of each fly-wheel, while their inner edges meet and are bolted together in the middle. These flanges are cut out to fit the frame, and at their upper portions they are cut back sufficiently to leave the necessary opening for the air into the bottom of the circumscribing space of the cylinder, as shown by the entering arrow in Fig. 1. The jacket D is supported on a ring *f'*, which is carried by brackets *f*, rising from the flanges F. The air-currents induced by the fly-wheels are directed by these flanges F upwardly into the circumscribing space around the cylinder.

Now in order to increase the radiating-surface of the cylinder, both body and head, and to provide for subjecting a maximum radiating-surface to the positive air-current being forced through the circumscribing space I employ fins or ribs which occupy this space and are arranged longitudinally of the cylinder in planes radial to the axis thereof. Those on the cylinder-body surface are designated by G and those on the cylinder's head by G'. They are set quite close to-

gether, so that they expose a very large surface to the air-current. They are best made separate from the cylinder and head, so that they may be made very thin and very numerous, 5 they are secured in grooves planed in the and cylinder and head. As they are non-integral with the cylinder, they may be of copper or other thin metal having good radiating properties. These fins or strips being lengthwise 10 of the cylinder do not interfere with the proper flow or circulation of the air-current between them, though they form the maximum radiating-surface, which surface being in the jacketed space is presented in the best 15 manner to the air-current.

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

In a gas-engine, the combination with a 20 vertically-disposed cylinder, and a driven crank-shaft arranged transversely below the same, of a casing surrounding said cylinder to form an air-space thereabout, a supporting-ring for said casing engaging the lower 25 end thereof said ring being provided with openings leading to the said air-space above

the cylinder, longitudinally-disposed ribs arranged around the cylinder and projecting into the air-space, a hollow head for the upper end of the cylinder having openings communicating with the air-space thereabout 30 and lateral openings leading to the exterior, auxiliary ribs in said hollow head, a housing to which the supporting-ring is secured, said housing inclosing the lower end of the cylinder 35 and the crank-shaft and opening at opposite sides to the exterior, fly-wheels on the crank-shaft adjacent to the openings in housing, said wheel being provided with oppositely-arranged fan-blade spokes for inducing a draft 40 of air through the wheels into the housing and forcing the same through the space surrounding the cylinder and the hollow head into contact with both series of ribs therein, and out through the lateral discharge-aper- 45 tures in said head; substantially as described.

In witness whereof I have hereunto set my hand.

CHARLES F. HITCHCOCK.

Witnesses:

HENRY G. W. DINKELSPIEL,
WILL J. LOVELAND.