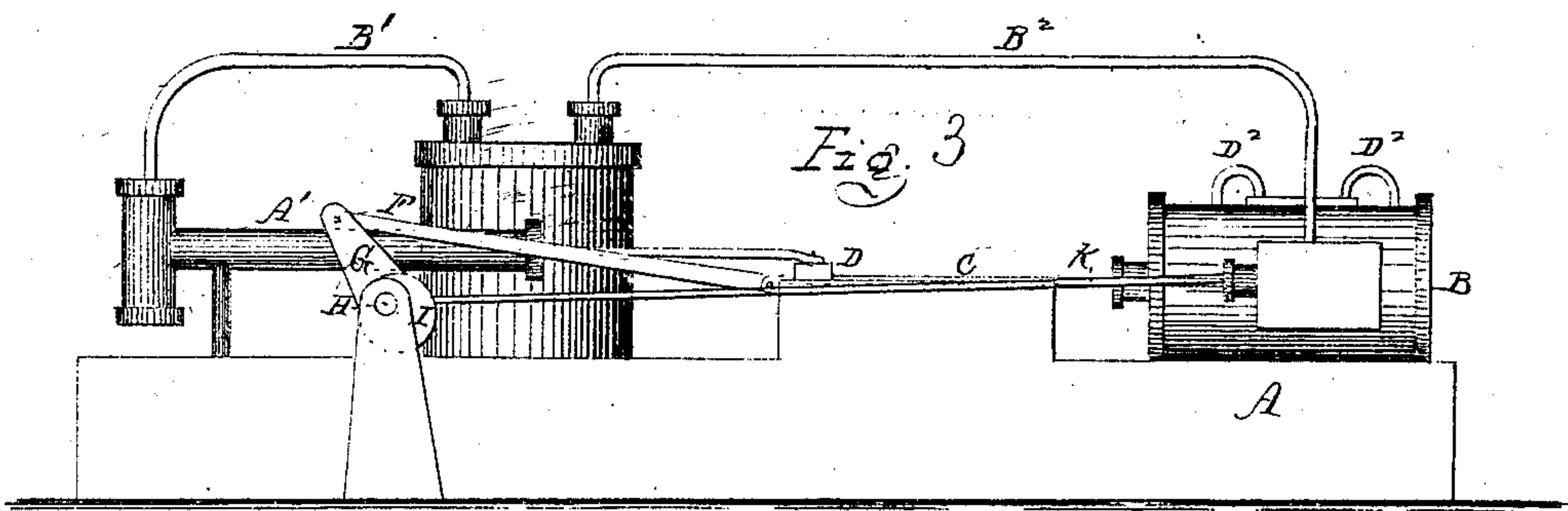
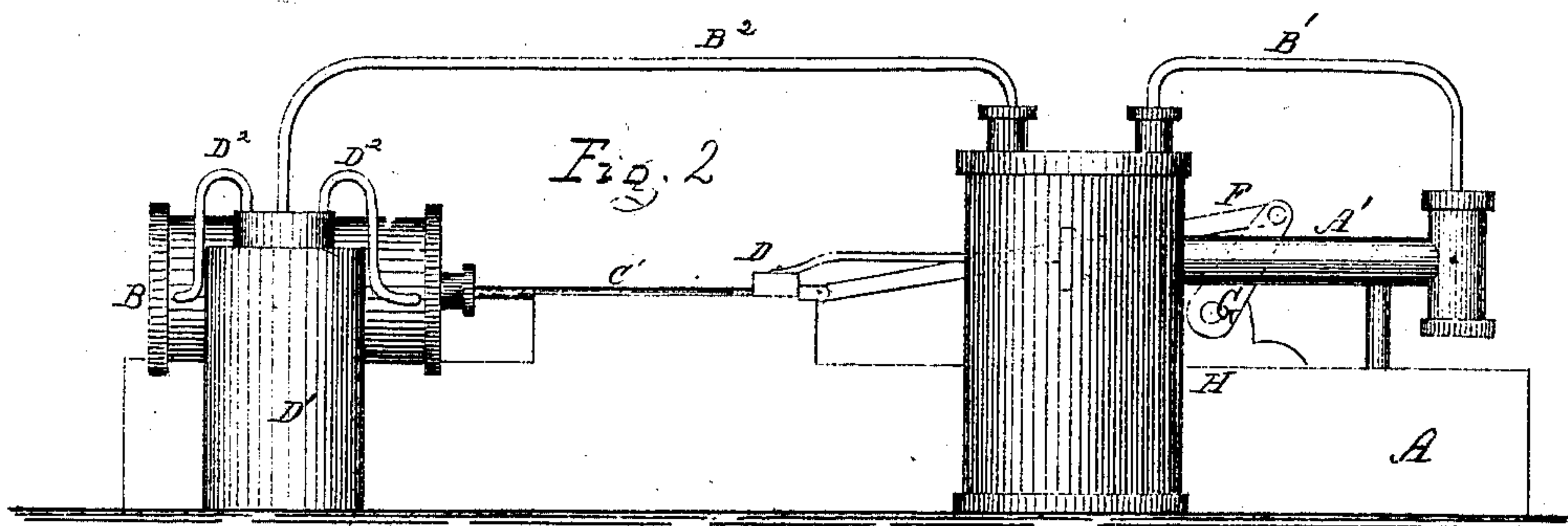
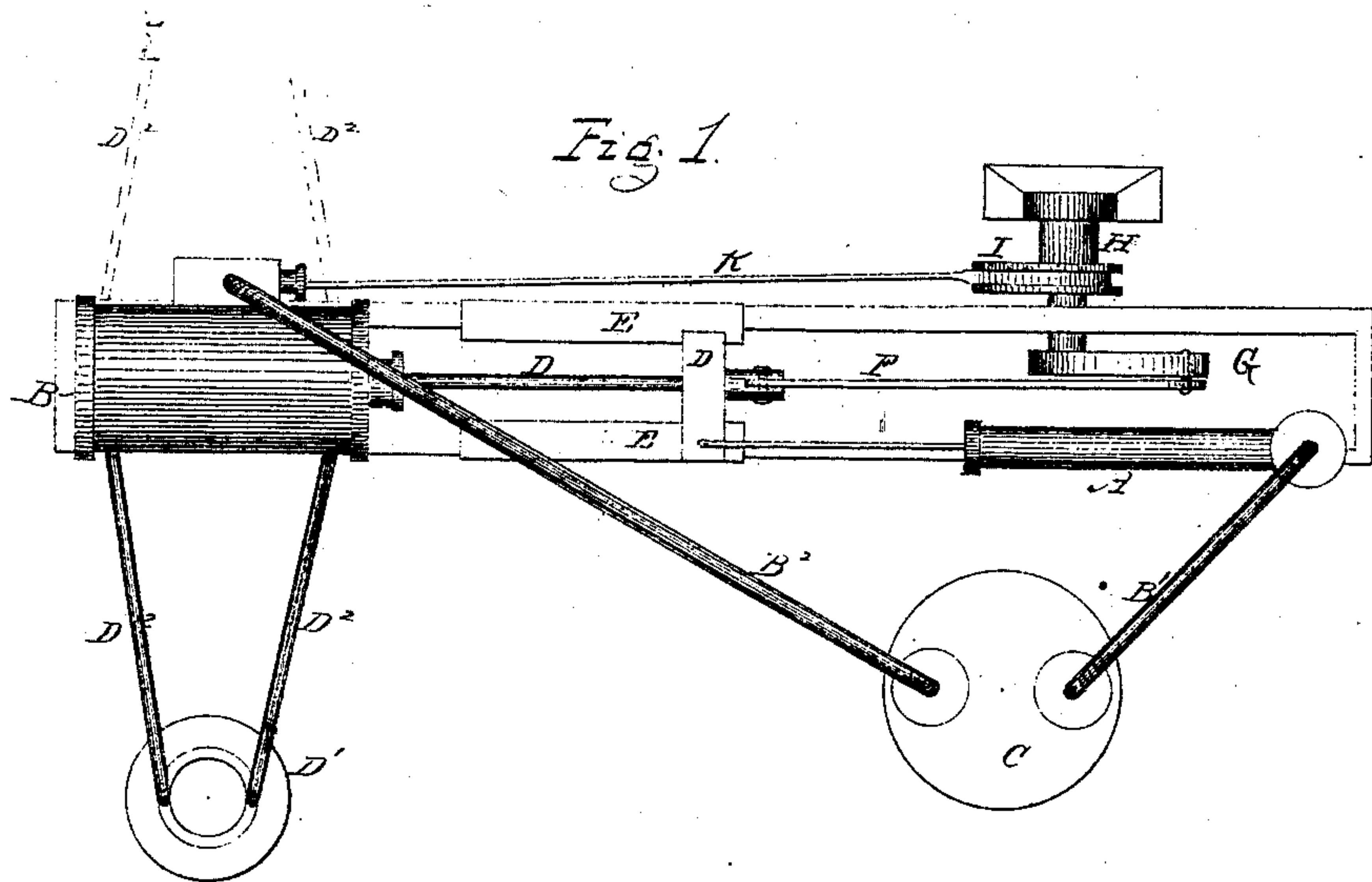


E. H. Grant, Air Engine.

No. 94,594.

Patented Sep. 7. 1869.



*Witnesses
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United States Patent Office.

EDWIN H. GRANT, OF WASHINGTON, DISTRICT OF COLUMBIA.

Letters Patent No. 94,594, dated September 7, 1869.

IMPROVEMENT IN COMPRESSED-AIR ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, EDWIN H. GRANT, of Washington, in the District of Columbia, have invented a new and useful Improvement in Compressed-Air Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a plan or top view of an engine of ordinary construction having my improvements connected therewith, showing a pump for compressing the air, a receiver for such air, a galvanic battery for producing electricity, and the wires for conducting the same to the air within the working-cylinder.

Figure 2 is a rear-side elevation.

Figure 3 is a front elevation of the same.

Corresponding letters refer to corresponding parts in the several figures.

It has long been well known that a current or spark of electricity in passing through air causes vibratory motions in the particles with which it comes in contact, or, in other words, that it agitates such particles, and gives motion to the same, at the same time that it imparts thereto a considerable amount of heat. My invention is designed to render available these forces in giving motion to the piston of an engine; and to this end,

It consists in an engine to the cylinder of which air is admitted under pressure, and into which a current of electricity is conducted after it entered such cylinder.

The invention further consists in the combination and arrangement of its parts, as will be more fully described hereinafter.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A, in the drawings, represents the frame-work of an engine;

B, the cylinder;

C, the piston-rod;

D, the cross-head;

E E, the guides;

F, the connecting-rod;

G, the crank;

H, the shaft;

I, the eccentric for moving the valve; and

K, the valve-rod.

All of the above parts may be of any approved or suitable construction; but as they are in common use and familiar devices, and as they do not form any part of my present invention, they need not be particularly described here.

It is proper to say that any engine that is capable of working steam or air advantageously, and which is supplied with a pump for compressing air, is a suit-

able one to act in conjunction with my improvements, which do not depend at all upon the construction of the engine with which they are connected for their efficiency.

The devices necessary to carry out and make available this invention are, first, a suitable engine in which to work air which has been previously compressed to any extent which may be found advantageous, an air-pump with which to compress the air, a receiver into which such air passes from the pump, suitable pipes to carry the air from the pump to the receptacle, and from thence to valve-chest of the engine, and a galvanic battery for generating electricity, which battery is to be supplied with the necessary wires or conductors for conveying such electricity to the air within the cylinder, and the necessary means for making and breaking the connection between such wires and the battery or material contained therein.

The above-enumerated devices will now be explained singly, and referred to by letters corresponding with those seen on the drawings, where

A' represents a pump, which may be driven from the cross-head of the engine, as shown, or in any other convenient manner. This pump may be of any approved construction that will render it capable of keeping the receptacle filled with air of the required pressure.

B' represents a pipe which leads from the pump A' to the receptacle or receiver C', while B² represents the pipe which conducts the air from the receiver to the valve-chest of the engine.

C' represents a vessel, which may be of any desired form, dimensions, and material, and should be of sufficient strength to sustain an internal pressure equal to that of as many atmospheres as it will at any time be desirable to use.

This vessel may be fixed in its position with reference to the pump and the engine which supplies it, and which, in turn, receives its supply from it; or a series of vessels may be provided, into which air may be compressed by any pump, however driven, which vessels may be transported to any place where an engine happens to be located, and each in turn put in communication with such engine's cylinder, and thus a strictly portable motive-agent may be furnished if found desirable.

It will be observed that in stopping the engine at any time it will be necessary to do so when the receptacle is filled with air at a pressure sufficiently great to start the engine again, and at such times to close the communication between the receptacle C' and the valve-chest, by means of any suitable valve or cock.

D' represents an electric or galvanic battery or batteries, of which there may be one or more, as circumstances may require. These batteries may be of the form constructed by Grove, Day, Nicholson, Small, or

of any other approved and known form, as my invention does not depend upon the manner of producing the electrical or galvanic current.

The battery or batteries are to be placed in some convenient position with reference to the working-cylinder, so that the conductors through or along which the current passes may enter the cylinder near its ends and at different points, so that those entering through one side or portion shall point directly toward those entering through the other side or portion.

The cylinder, at the points where these conductors enter it, is to be provided with a recess or a socket containing such recess, for the reception of India rubber, sealing-wax, or some other non-conducting substance, through which such conductors are to pass. I prefer to fix the positions of these conductors in the cylinder with reference to the distance between their ends or points, and regulate the force of the current by inserting the conductors a greater or less distance into the generator or battery; but it is apparent that the same result may be accomplished by making those portions which enter the cylinder adjustable, and placing them at a greater or less distance from each other. In practice, a continuous current of electricity may be allowed to flow from the battery or batteries into the cylinder, and thus cause the ingoing jet of air to come in contact therewith at the instant of its entrance, by which the result spoken of in the beginning of this specification is produced; but as this would be likely to cause such an agitation in the inflowing current of air as to some extent to interfere with the proper filling of the cylinder therewith, I prefer to attach to the cross-head of the engine, or to some other of its moving parts, some of the well-known devices for making and breaking the circuit, or of putting the terminal parts of the conductors in communication with the batteries, and thus providing the means of automatically admitting the current of electricity to the cylinder after the requisite amount of air has been admitted to

produce the stroke of the piston, thus causing any increase of power consequent upon the expansion or agitation of such air to be expended in forcing forward the piston rather than in resisting the incoming current of air.

D² represents the conducting-wires, which extend from the batteries to the cylinder. They may be of any good conducting-material, and of any size required for the particular engine and battery which they are to connect.

I have thus far described my improvement as applicable only to engines in which compressed air is to be used as the motive-agent, but it is apparent that it is equally applicable to engines in which steam is so used, the arrangement of devices being substantially the same in either case.

Having thus described my invention,

What I claim, and desire to secure by Letters Patent, is—

1. An engine combining in its construction the following elements, namely, a cylinder in which compressed air is used as a motive-agent, a reservoir for such air, and a galvanic or electric battery or batteries for producing a current of electricity to be conducted to said cylinder, substantially in the manner set forth.

2. The combination of the cylinder B, air-pump A', reservoir C', connecting-pipes B¹ B², batteries D¹, and conducting-wires or connections, substantially as set forth and shown.

3. The combination of an air-receiver, a working-cylinder, and a galvanic or electric battery, substantially as shown and described.

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

EDWIN H. GRANT.

Witnesses:

W. D. O'CONNER,
S. F. DOLBEAR.