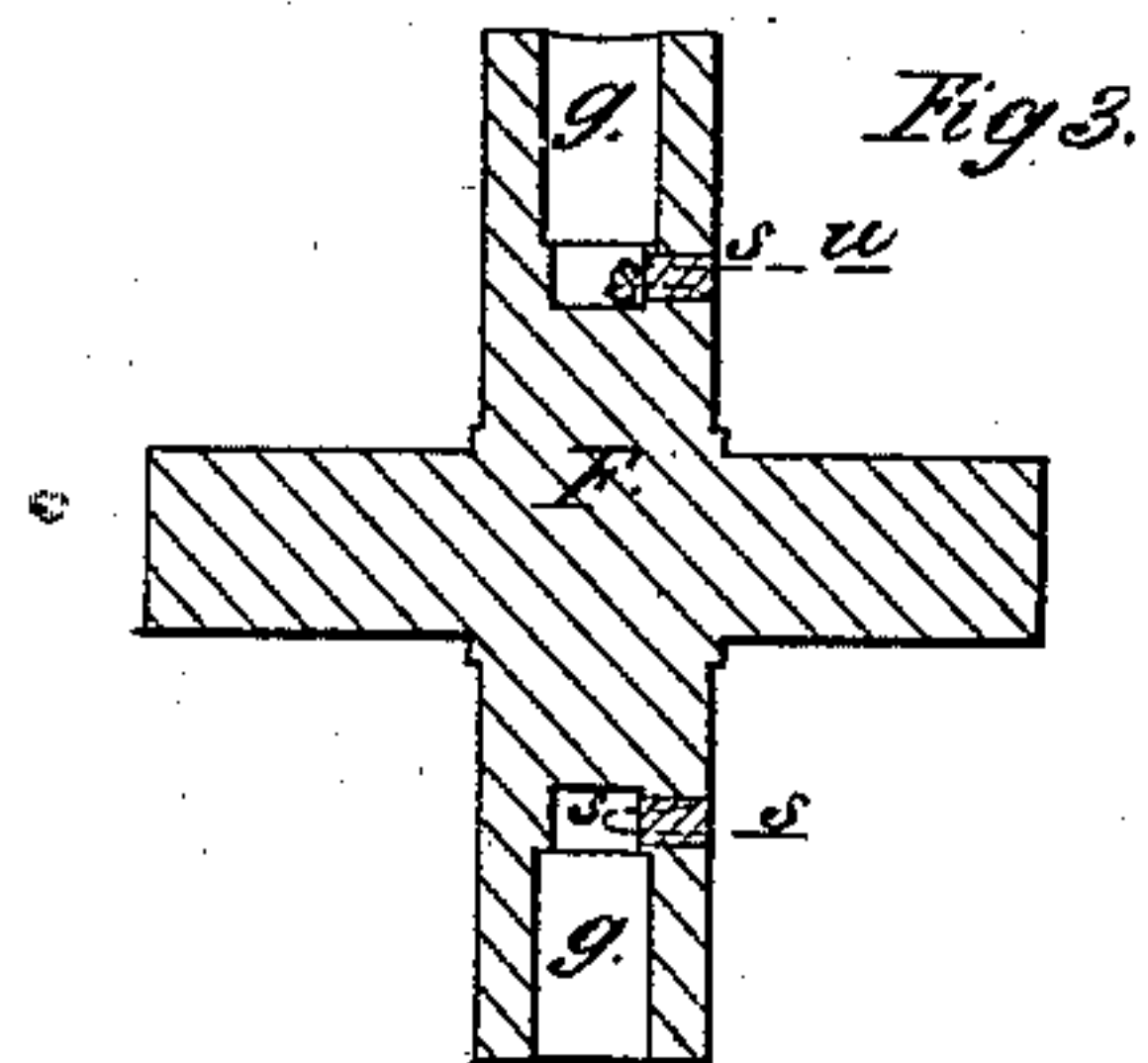
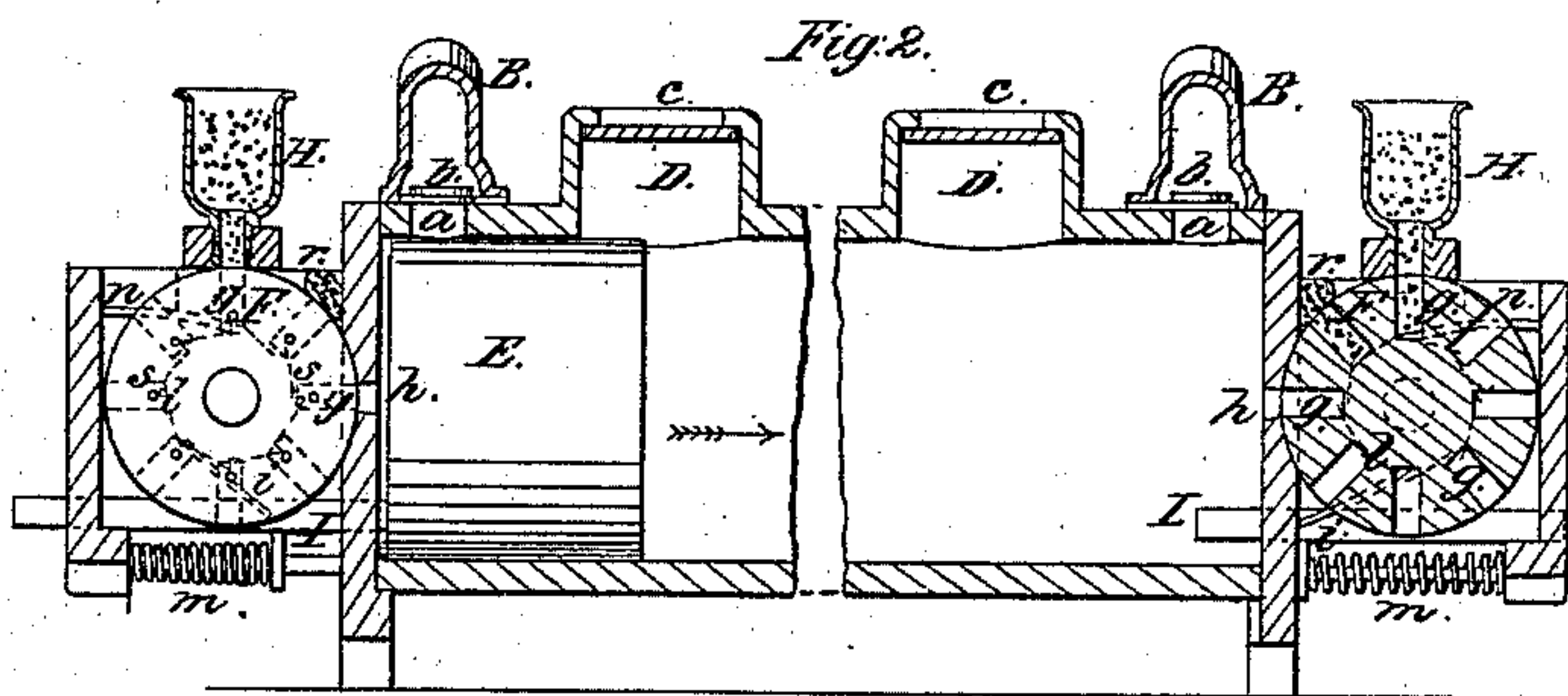
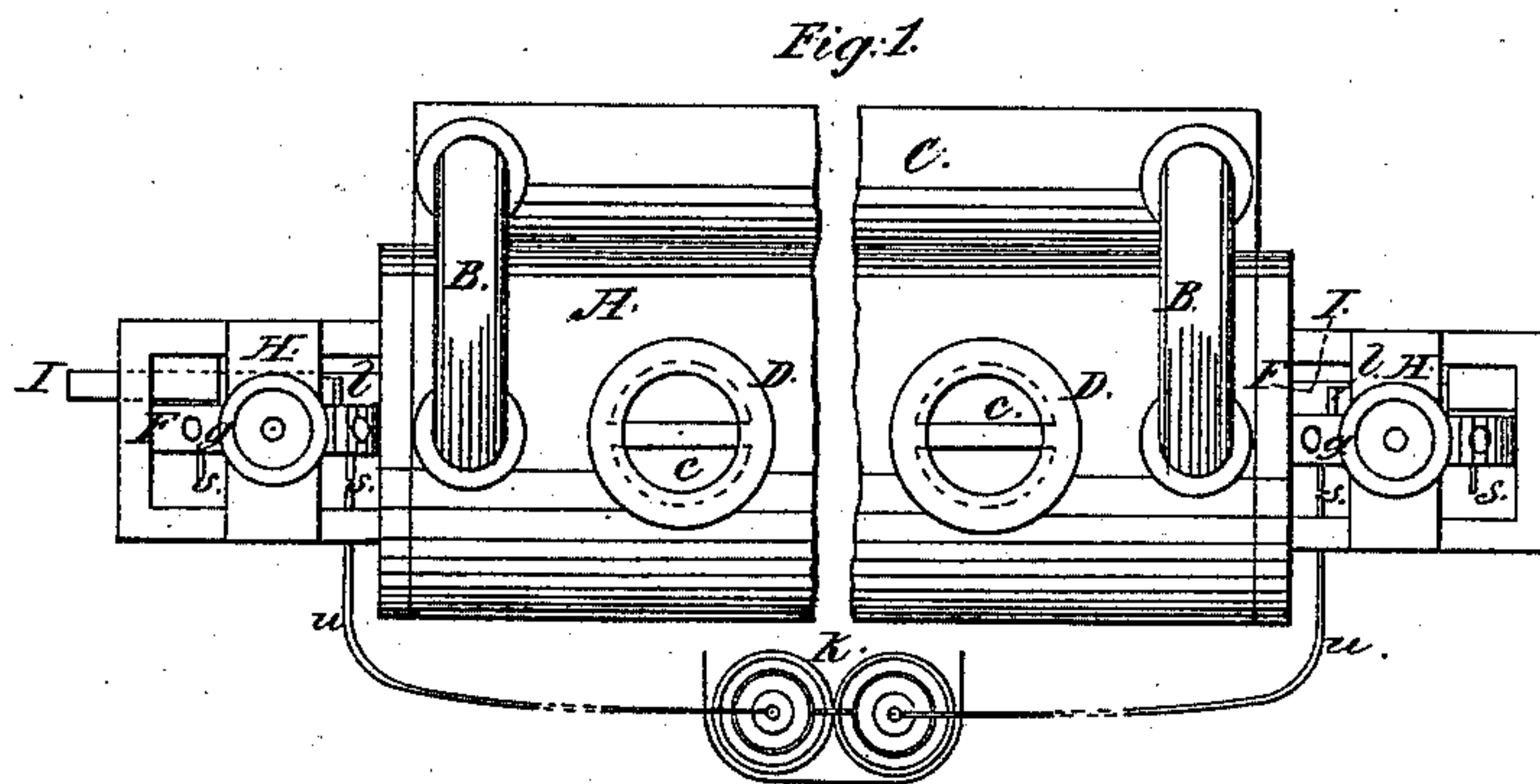


B. T. BABBITT.
AIR CONDENSING ENGINE.

No. 79,938.

Patented July 14, 1868.



Witnesses:

J. M. Coombs
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Inventor:

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United States Patent Office.

B. T. BABBITT, OF NEW YORK, N. Y.

Letters Patent No. 79,938, dated July 14, 1868.

IMPROVEMENT IN GAS-EXPLOSIVE ENGINES FOR CONDENSING AIR.

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, B. T. BABBITT, of the city, county, and State of New York, have invented a new and useful Improvement in Motors or Power-Generating Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which forms part of this specification, and in which—

Figure 1 represents a plan of an apparatus in part illustrating my invention,

Figure 2 a vertical longitudinal section of the same, and

Figure 3 an edge view or section, on an enlarged scale, of one of the powder-magazines in part, with insulated wires or conductors for firing the charge to operate the motor where loose-powder charges are used for the purpose, and electricity employed to fire them.

Similar letters of reference indicate corresponding parts.

My invention consists in a novel method or process of generating power by compressing air within a suitable reservoir or reservoirs, through the action of a free or unrestrained and independent piston, that is a piston which is loose or detached from any outside driving-mechanism, and that is worked within a cylinder, by being shot alternately in opposite directions, through a powerful gaseous explosion or temporary powerful expansive force applied to start said piston, which, by its weight and momentum, is caused to continue the direction given it by the starting-force, and to compress air received through a suitable valvular opening or openings in its cylinder, into a power-accumulating reservoir or reservoirs, that may serve to work an engine, or that may be applied to various other useful purposes.

By this, my improvement, a loose or independent piston acting as a weighty projectile, is used to effect the compression, thus avoiding outside cutting of parts, and dispensing with much complication of details, besides possessing other advantages over previous methods of generating power by the compression of air.

And my invention further consists, in combination with such an apparatus or other motor acting upon the principle of gaseous explosion or ignition of explosive material, such as gunpowder, to operate a piston within a closed cylinder or tube, in a revolving many-chambered magazine at either end of said cylinder, acting in concert with a battery for ignition of the charges successively and alternately, by electricity, at opposite ends of the cylinder.

Referring to the accompanying drawing, A represents a cylinder or tube, of any suitable diameter, and considerable length, closed at either end, and of any requisite strength. This cylinder or tube is connected at or near either end, through orifices *a a*, having valves *b b* covering them, and which open outwards, by pipes B B, with a reservoir, C, for the retention of air compressed into it from the cylinder A, that is further provided with air-receiving inlets D D, fitted with valves *e e*, opening inwards to counteract the formation of a vacuum in the cylinder A, and to keep it supplied with air for a repetition of the compressing-process.

The air is compressed in the cylinder A, and delivered or forced at either end alternately through the pipes B B, into the reservoir C, by a loose, or, so far as outside devices are concerned, disconnected piston, E, of considerable weight and length, and which is designed by its momentum to act as a projectile to effect the necessary atmospheric compression, and is set in motion alternately from opposite ends of the cylinder by any suitable sudden gaseous or other explosion, or expansion of gas or vapor under heavy pressure, operating to start the piston, such as, for instance, steam of a very high pressure let in by a jet or puff, solid or condensed carbonic-acid gas used in small or detached quantities, or it may be by an explosion of gunpowder. This latter material will here be selected by way of illustrating more clearly the invention, and under a modification or principle of action which it will be found advantageous to adopt. Thus outside the ends of the cylinder, and working in close contact therewith on their peripheries, are revolving powder-magazines or cylinders F F, set, say, on horizontal shafts, and made up of cups or chambers *g*, that, as the magazines revolve, are brought successively under a suitable supply-vessel, H, and when filled with powder therefrom, are, by the further rotation of said magazines, brought in line with apertures *h h* in the ends of the working-cylinder A, and the powder

in them there exploded to give the required impetus to the piston E. The explosion of course only takes place when the piston having reached the one end of its stroke, is in close proximity to the exploding-chamber, consequently the rotary motion of the magazines F F requires to be intermittent, and to be so timed as that a charged chamber is alternately presented to the openings through the opposite ends of the cylinder A. To effect this, the piston E, as it reaches or approaches the ends of its stroke, is made to strike and force outwards alternately rods I I, which carry spring or other pawls *z z*, that bite in or on ratchet-wheels *l l*, secured to the ends or faces of the magazines, and so give the requisite and timely motion to the latter, to secure their filling and presentation of charged chambers to the orifices in the ends of the cylinder A, springs *m m* acting against projections from the rods I I to afterwards return the latter rods to their original positions for a repetition of the like action on them by the piston E, and other pawls, *n n*, serving to prevent back motion to the magazines. To obviate back-fire, that is, the explosion of the charge communicating fire to the succeeding chamber or chambers in the magazine, damp sponges may be placed, as at *r*, to rest upon the peripheries of the magazines.

To fire the charges as the chambers *g* are brought in succession opposite the apertures *h h*, the intermittently-revolving magazines F are provided with conductors or wires *s* projecting from their sides, and communicating with the chambers *g*, and that as the magazines are revolved, and said chambers come in line with the apertures *h h* successively, and alternately at opposite ends of the cylinder A, pass close to or touch wires *u u*, connected with a battery or batteries, K, which fires the charge by the electric current transmitted therefrom, the wires *s* projecting into the powder in the chambers *g*, and establishing the negative connection with the battery, while other wires, *s'*, pass from the powder in the chambers *g* in close proximity to the inner ends of the wires *s*, and are extended to touch the metal of the magazines F on the outside, for the purpose of establishing connection with the positive pole of the battery, both wires, *s s'*, being suitably insulated in their passage through the magazine from the chambers *g*. This arrangement for producing a spark is more clearly exhibited in fig. 3. Any other suitable arrangement, however, may be adopted, but the one here described is close and automatic, the magazines being also automatically operated by the independent piston E.

Instead of loose-powder charges, however, or magazines fired by electricity, cartridges ignited by percussion may be used to give impetus by explosion to the piston, the sizes of the cartridges being varied to suit the different amounts of powder required.

While the piston E is operated freely or independently of any outside connections, and, or at least largely so, by the momentum due to its weight and impetus received at the start to urge it successively in opposite directions, it has its motion gradually retarded at the extreme end of either stroke, and is prevented from butting against the ends of the cylinder by compression of the air in front of it so as to form a cushion; the escape-openings *a a* for the compressed air being arranged at a certain distance inside, or short of the ends of the cylinder, for the purpose.

By a piston thus operating freely or independently of outside connections, the objection which has heretofore been raised to the cutting of and sudden strain or jerk on the working parts, by an abrupt and powerful starting-force, is obviated, and an engine or motor may be connected with or draw its supply of compressed air from the reservoir C with as great ease and regularity as steam is supplied from an ordinary boiler, or such compressed air be used in any other desired way, and for various purposes. In some cases or for some purposes, the air, as compressed, may be passed off direct without being stored in a reservoir. In speaking of the piston E as generating power by the compression of air, of course the term "air" is designed to include not only atmospheric but also other air or gas, by suitably connecting the inlets D D with appropriate supply-chambers or tanks.

What is here claimed, and desired to be secured by Letters Patent, is—

1. A motor or power-generator, operating to compress or force air or gas by the reciprocating action, in an automatic manner, of a weighty and independent piston or projectile, free from constant connection with outside working parts, the same being started or set in motion by any suitable explosive force or expansion of gas or vapor under heavy pressure, within a tube or cylinder provided with suitable openings for producing the necessary explosion or starting-impetus to the piston, and for reception and discharge of the fluid which it serves to compress, substantially as specified.

2. The combination of intermittently-revolving or other equivalently-operating many-chambered magazines at opposite ends of the tube or cylinder A, suitable powder-feeding vessels or chambers thereto, and wires or conductors *s s'*, for operation in connection with the wire or wires from a battery, to explode the charges at opposite ends of the cylinder alternately, essentially as and for the purpose or purposes herein set forth.

3. The combination, with the loose or independent piston E, operating as described, of rods I I, or their equivalents, and suitable mechanism for giving in an automatic manner, or by the action of said piston, the necessary impetus to the latter at starting, by gaseous expansion or explosion, substantially as specified.

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Witnesses:

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A. LE CLERC.