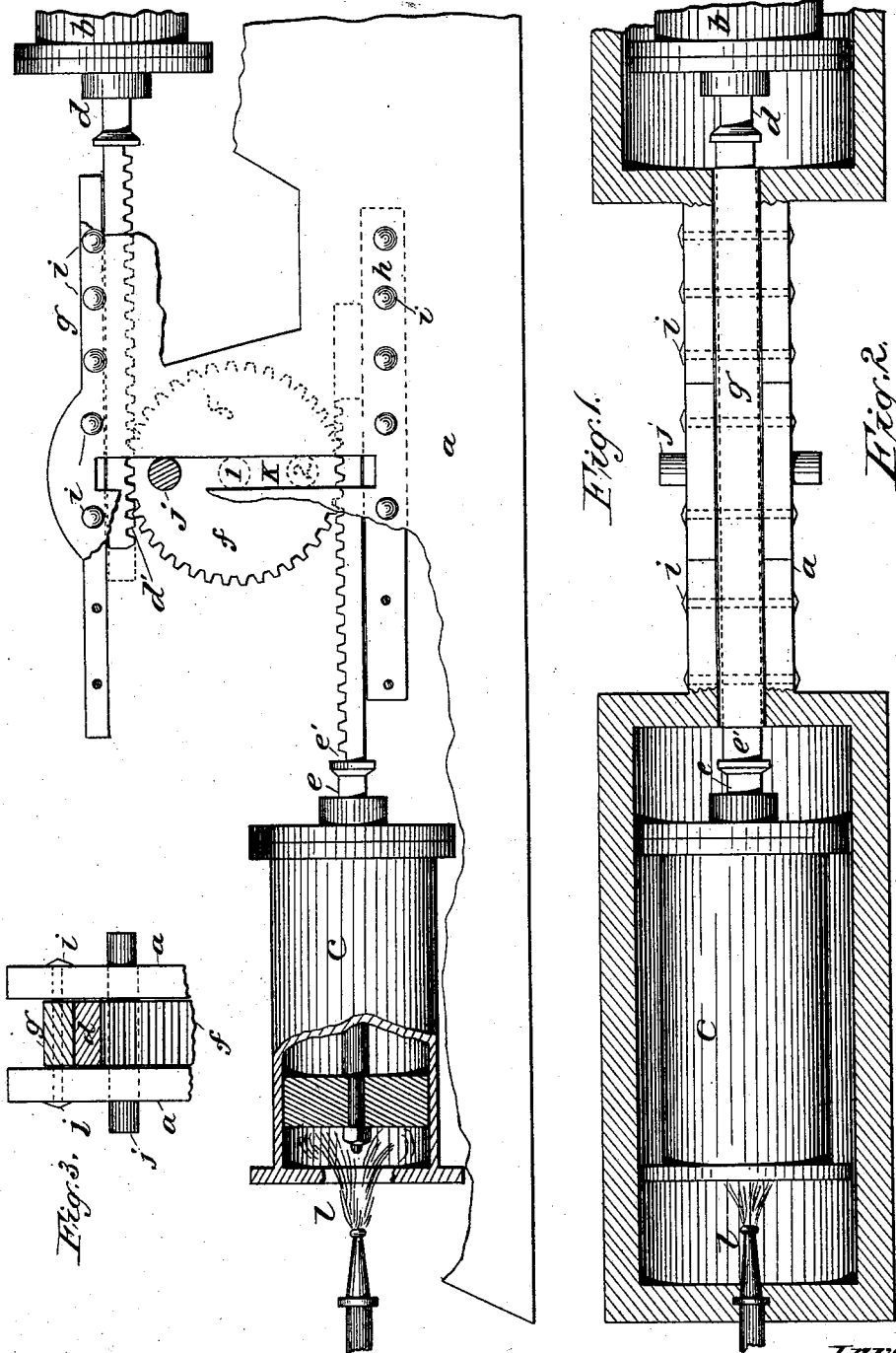


(No Model.)

W. A. PITT.
AIR COMPRESSOR.

No. 386,028.

Patented July 10, 1888.



Witnesses
O. M. Benjamin.
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UNITED STATES PATENT OFFICE.

WILLIAM A. PITT, OF GLENBROOK, CONNECTICUT.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 386,028, dated July 10, 1888.

Application filed June 30, 1887. Serial No. 243,048. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. PITT, a citizen of the United States, residing at Glenbrook, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Air-Compressors, of which the following is a full, clear, and exact specification.

The purpose of my improvement is to provide means whereby an equivalent in compressed air in volume or pressure is obtained for the power expended in compression. This I accomplish by a certain mechanical arrangement which is substituted for the crank, connecting-rod, and fly-wheel heretofore employed for the transmission of power from the piston of a steam-engine, and through which the piston-rod is caused to act at the full or weaker end of the stroke with as much power as was expended in propelling it at the beginning of its stroke.

In the accompanying drawings, which clearly illustrate my improved mechanism, Figure 1 is a side elevation of an air-compressor containing these improvements, a portion of the bed or frame being broken away to show the operating parts. Fig. 2 is a top plan view of the same; and Fig. 3 is an end view thereof, the lower portion being broken off.

Let *a* represent the bed or frame of the machine supporting the operating mechanism, and *b*, the steam-cylinder, and *c* the air-cylinder, both being of equal dimensions. *d* and *e* are respectively the piston-rods of the steam and air cylinders. On the outer end of the piston-rod *d* is formed a rack, *d'*, and a similar rack, *e'*, is provided on the air piston-rod *e*. The teeth of both racks are made to mesh into or engage with a centrally-mounted gear or spur wheel, *f*. *g* and *h* are longitudinal blocks or strips secured, respectively, to the top and bottom portions of the frame *a* by means of bolts *i*, to form beds or guideways within which the rack ends of the two pistons slide and by which they are kept in constant engagement with the spur-wheel *f*. These guides may be cast on the frame *a*, if desired, instead of being bolted thereto.

j is the shaft on which the spur-wheel *f* is mounted. The ends of this shaft are projected through a vertical slot or opening, *k*, formed

in each side of the frame *a*, so that on the rotation of the spur-wheel its axis is caused to travel in a vertical line to and fro within the opening *k*, and becomes, as it were, a changeable fulcrum from the beginning to the finish of the stroke of the piston-rod *d*.

l represents a spray-nozzle connected with any suitable apparatus, which is so arranged as to inject a spray of water into the rear end of the air-cylinder *c*, which is left open in order to keep the piston and valves cool either while the piston-rod is or is not in motion.

The operation of the device is as follows: Steam being admitted into the cylinder *b* gives to the rack *d'* a forward movement to the left, which rotates the gear-wheel *f* and imparts to the rack *e'* a reverse or forward movement to the right. As the gear-wheel begins to revolve its axis *j* is moved downward in its slot to midway between the two racks, the engine in its movement making a short thrust of the piston-rod *d* and causing a long thrust of the air piston-rod *e*, as is clearly indicated by dotted lines in Fig. 1, whereby the gradually-increasing resistance is overcome to the point indicated. From that point the movement is reversed. The long thrust of the steam-piston causes a short thrust of the air-piston *e*, which overcomes the greater and constantly-increasing resistance.

In applying my method to air-compression it is usual to place the axis or movable shaft at a distance of about one-fourth of the radius from the periphery of the gear-wheel, whereby, with one-quarter of the stroke of the steam-piston, I am enabled to cause a three-quarters stroke of the air-piston, at which point the axis is equidistant from the racks and the leverage equal and the gear-wheel *f* one-fourth revolution to the right, which results, at the point indicated, in having secured an equivalent of compressed air both in volume and pressure for the amount of steam expended. Now, from this point, as the axis *j* moves downward in the slot *k* toward the point marked "2," we have, to commence, three-fourths stroke of the steam-piston left to make one-quarter stroke of the air-piston, either to deliver the air in volume and pressure as already attained, the steam being cut off after the one-quarter

travel of its piston to complete such result, or to allow the steam to be cut off later on in its travel and permit an equivalent in volume of the compressed air to be delivered, only at a much higher pressure, as may be desirable, and proportionate to the point whereat the steam shall have been cut off in the steam-cylinder.

My improved device is equally applicable to all engines, in which cases I am enabled to utilize the full expansive property of the steam without diminished result.

Referring to the drawings, it will be observed that the air-cylinder *c* is left open on one end, so that the air is only compressed at one end of the cylinder, the object being to afford as much time as possible for a radiating away of the heat absorbed while effecting the compression.

By my device it will be seen that while the greater compression is taking place, and from the commencement of the working-stroke of the air-piston, the speed is diminished proportionately, thereby effecting the true requirement necessary for the cooling process in air-compression.

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

1. The combination, in an air-compressor,

of a steam-cylinder and air-cylinder with their piston-rods, each provided with a rack end, and a gear-wheel having a movable axis arranged to engage with said racks, substantially as set forth.

2. The combination, with the steam-cylinder, air-cylinder, and their piston-rods, each having a rack end, of a spur-wheel mounted on an axis located near the periphery of the wheel and arranged, substantially as described, to have a vertical movement in the frame of the engine during the revolution of the wheel, whereby it becomes a changeable fulcrum from the beginning to the finish of the stroke of the steam-piston, as set forth.

3. In combination, the steam-cylinder *b*, air-cylinder *c*, having an open end, nozzle *l*, piston-rods *d* and *e*, with racks *d'* and *e'*, toothed wheel *f*, shaft *j*, and frame *a*, with slot *k*, as set forth.

4. The combination of the frame *a*, having guideways *g* and *h*, piston-rods *d* and *e*, racks *d'* and *e'*, spur-wheel *f*, adapted to engage said racks, and shaft *j*, arranged to move in a vertical slot in the frame *a*, as set forth.

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Witnesses:

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