(No Model.)

2 Sheets—Sheet 1.

O. A. CLARK.

AIR COMPRESSOR.

No. 453,374. Patented June 2, 1891.

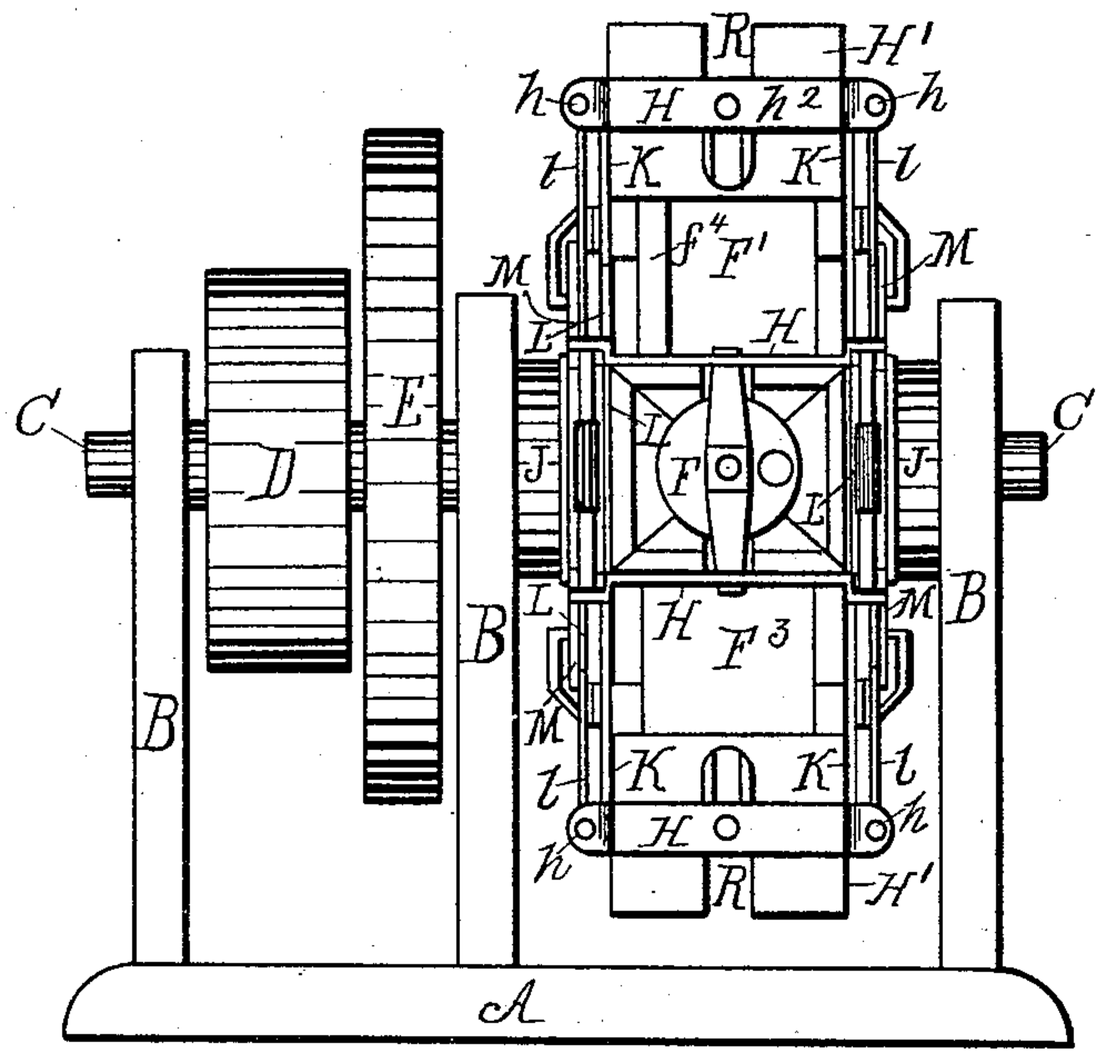

Fig. 1.

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig-3-

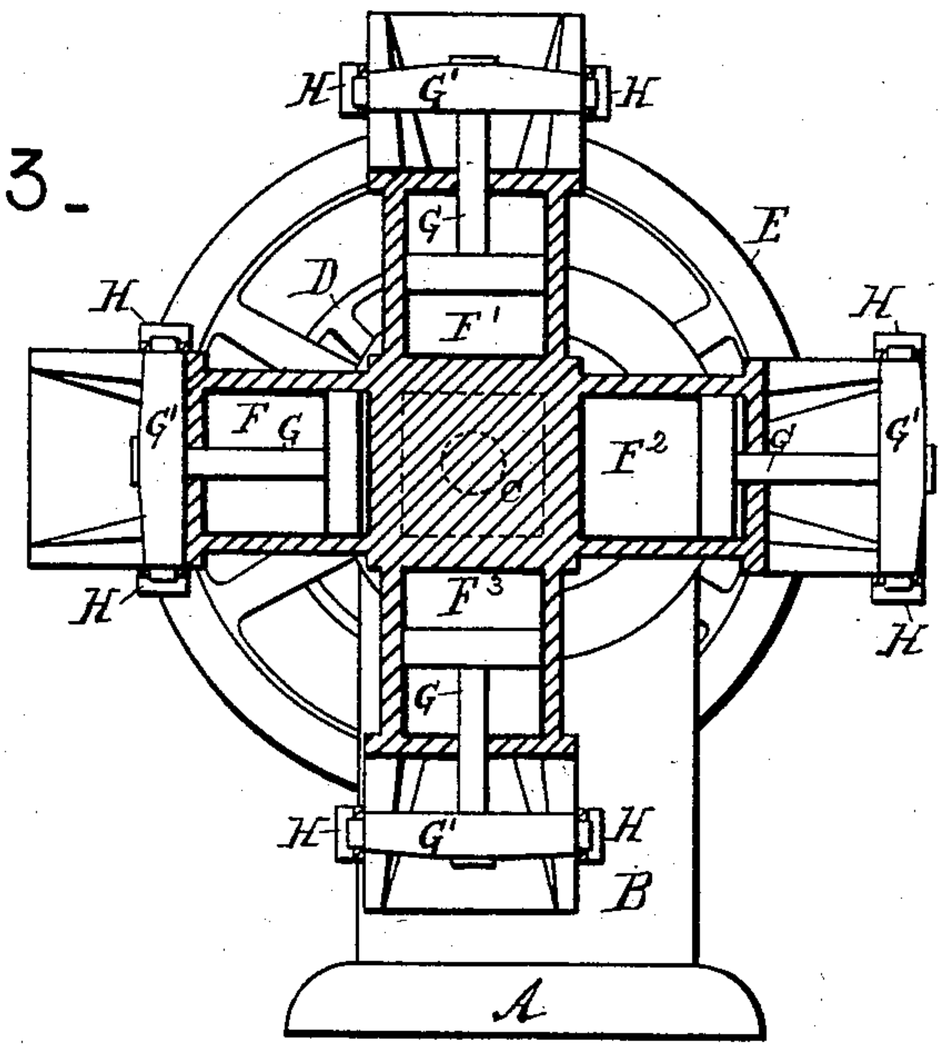
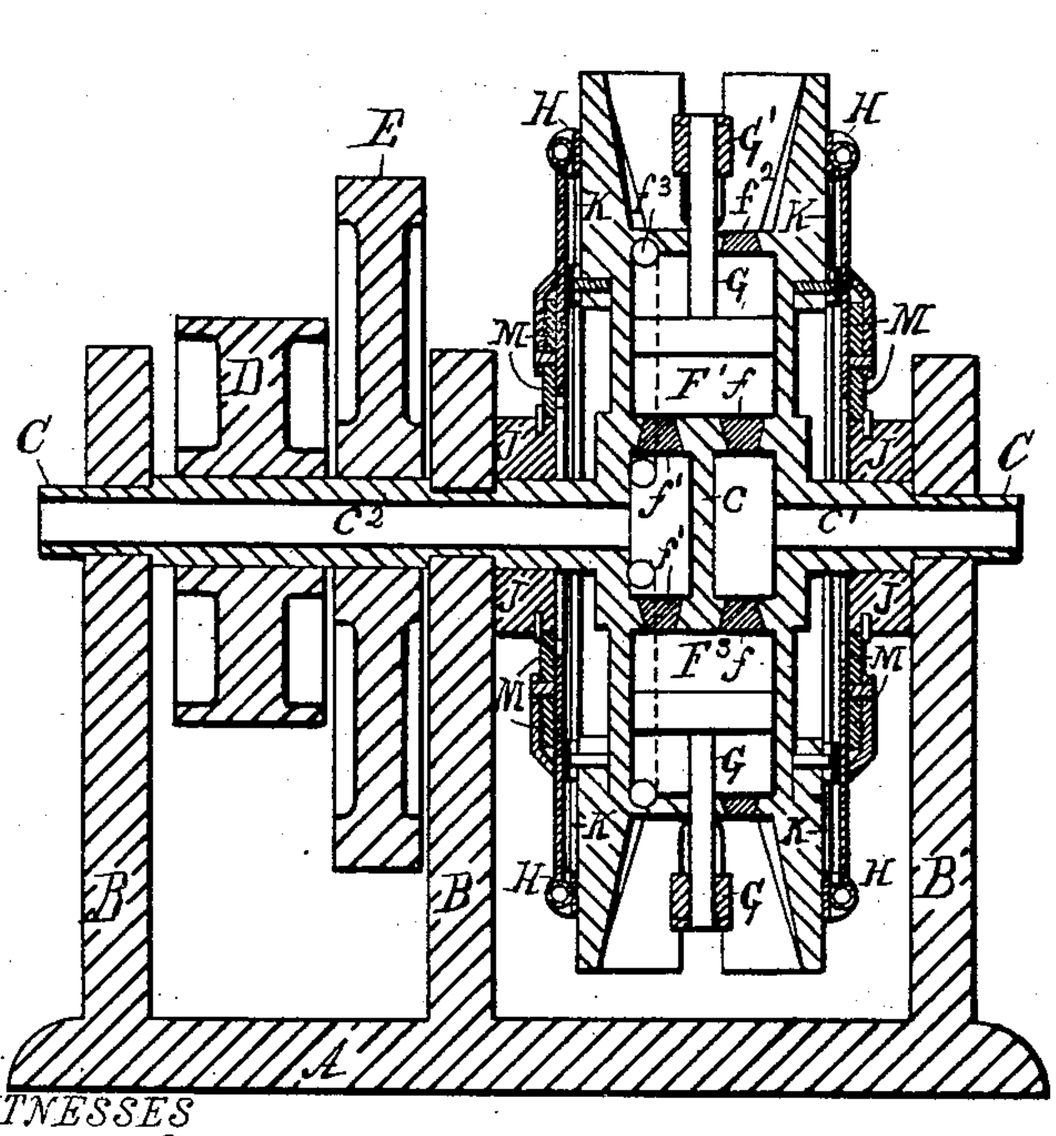


Fig-4-



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UNITED STATES PATENT OFFICE.

OWEN A. CLARK, OF FIFE LAKE, MICHIGAN.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 453,374, dated June 2, 1891.

Application filed April 28, 1890. Serial No. 349,736. (No model.)

To all whom it may concern:

Be it known that I, OWEN A. CLARK, a citizen of the United States, residing at Fife Lake, county of Grand Traverse, State of Michigan, have invented a certain new and useful Improvement in Air-Compressors; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

It is the object of my invention to provide an air-compressor which shall be of simple construction and yet capable of a large amount of work by the use of a comparatively small amount of power; and it consists in a combination of devices and appliances hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of my apparatus. Fig. 2 is an elevation at right angles to Fig. 1 with one of the uprights or supports removed. Fig. 3 is a vertical section on the line $x\,x$ of Fig. 1. Fig. 4 is a view at right angles to Fig. 3.

In the apparatus involving my invention, A is a suitable base.

B represents stand-bearings which stand upon the base.

C is a hollow shaft rotating in the bearings.

D is a pulley for driving the shaft.

E is a fly-wheel.

F F′ F² F³ are compressing-cylinders mounted upon the shaft and communicating with the hollow of the shaft.

G are pistons in the cylinders, and the piston-rods pass through orifices in the center of the tops or outer ends of the cylinders. The ends of the piston-rods outside of the cylinders pass through and are fixed to cross-heads G′. The ends of these cross-heads pass through and are fixed into the opposite sides h^2 of rectangular frames H. These frames slide upon rectangular boxes H′, which are fixed to the outer ends of the cylinders, and these boxes have slots R in their sides, said slots extending from the outer ends of the boxes to the outer ends of the cylinders, in which slots the ends of the cross-heads play. Rods h run parallel with the sides h' of the frame H, and the said rods are fixed at their ends into the projecting edges of the sides h^2. The frames H on the directly-opposite cylinders are rigidly connected by bars K.

L represents circular frames, each of which has four pitmen l radiating from it. These pitmen at their outer ends are loosely fitted upon the rods h, and are thus adapted to slide along the said rods. These pitmen are provided with arms P. Between the inner ends of these arms and the inner ends of the pitmen are sustained track-wheels M. These track-wheels travel on the nearly-circular tracks J. These tracks are eccentric to the shaft C, and they are located on the uprights or stand-bearings B.

N are links fixed at one end to the cylinders and at the other end to the pitmen. These links serve to render more uniform the working of the pitmen on the rods h.

I will now describe the valving, &c., of my apparatus. The hollow in the shaft C is divided into two sections. c' is the air-inlet. c^2 is the air-outlet, and c represents the enlarged ends of c' and c^2. The air-inlet communicates with the cylinders through the valves f. The cylinders communicate with the air-outlet through valves f' at their inner ends and through valves f^3 and conduits f^4, which lead from their outer ends down around to the enlarged end c of the air-outlet c^2. The cylinders also communicate with the exterior air through the valves f^2, located at their outer ends.

Another feature of my apparatus is the following: It is readily seen that if the pistons had no weight the power for driving my apparatus would not be at all affected by changes in the positions of the cylinders; but each piston may weigh five hundred pounds, more or less. Now, looking at the power sufficient to drive only the weight of the pistons, we see when the cylinders are in the horizontal position of the cylinders F and F² that the pistons rest upon the sides of their cylinders, and therefore all the power required to move a pair of pistons in this position is that amount which will slide the pistons along the sides of their cylinders; but when the cylinders are in the vertical position of the cylinders F′ and F³ enough power to lift the full weight of a pair of pistons is required, and therefore when the cylinders are in this position the greatest back action is felt. Now to dis-

tribute this intermittent back action I swell out or make higher the track J at a point T, which point is located about half the track distance between the cylinders F′ and F²—of course at a point in the track directly opposite the point T. I make such a depression *t* in the track that the distance from the swell T to the depression *t* is just equal to the diameter of the truly circular part of the track.

I will now describe the operation of my apparatus. Power is applied at D. This rotates the shaft C, and with it the cylinders F F′ F² F³, which are mounted upon it. The cylinders carry with them the frames H, and they consequently carry with them the circular frames L, with their radiating pitmen *l*, the arms of the pitmen P, and the track-wheels M. These track-wheels run on the eccentric track J, and therefore, since the directly-opposite frames H are rigidly connected by bars K, the pistons of directly-opposite cylinders work together—that is, when the piston-head in cylinder F is next to the shaft the piston-head in cylinder F² is at its farthest point from the shaft. As a consequence of the pitmen being rigidly connected, when the pitmen of the cylinders F and F² take their position, as seen in Fig. 2, the pitmen of cylinders F′ and F³ slide along the rods *h* to their farthermost position toward the right. At the inward stroke of a piston air is forced through a valve *f′* into and through the air-outlet c^2 into a receiver. At the same time air is drawn in at the top of the cylinder through a valve f^2. At the outward stroke air is drawn through the air-inlet *c′* and the valve *f*, and at the same time air is forced out through the valve f^3 and conduit f^4 and into and out through the air-outlet c^2 and into the receiver.

What I claim is—

1. An air-compressor consisting of the combination, with a shaft with cylinders mounted thereon in pairs diametrically opposite each other and adapted to rotate therewith, of a frame engaging the pistons of said cylinders, said frame journaled eccentrically to said shaft and adapted as the cylinders are rotated to actuate said pistons, substantially as described.

2. An air-compressor consisting of the combination, with a hollow shaft through which air is admitted and compressed air is discharged, of several cylinders arranged in pairs, each cylinder of any pair diametrically opposite the other cylinder of that pair, and a frame engaging all said pistons, said frame journaled eccentrically to said shaft and adapted as the cylinders are revolved to actuate said pistons, substantially as described.

3. An air-compressor consisting of the combination, with a shaft with a longitudinal orifice through it for the discharge of compressed air, of cylinders mounted thereon in pairs, the piston of each cylinder connected with the piston of that cylinder diametrically opposite, and a frame engaging said piston connections, said frame journaled eccentrically to said shaft, and anti-friction rollers adapted to receive and sustain the bearings of said frame upon its eccentric path, substantially as described.

4. An air-compressor consisting of the combination, with a hollow shaft, as explained, of a series of cylinders arranged in pairs, mounted on said shaft, and a frame engaging said pistons, said frame journaled eccentrically with said shaft and adapted as the cylinders are rotated to reciprocate the pistons, said frame engaged with the pistons by a laterally-sliding connection, and links engaging the cylinders with said frame, whereby the parts are all held in proper juxtaposition without binding, substantially as described.

5. An air-compressor consisting of the combination, with a shaft, a series of cylinders, their pistons, and connecting-frame, as explained, of a track or bearing for said frame of uniform diametric dimensions, arranged eccentrically to said shaft, said path having at one part of its length a projecting segment with a corresponding depressed segment diametrically opposite, substantially as and for the purposes described.

In testimony whereof I sign this specification in the presence of two witnesses.

OWEN A. CLARK.

Witnesses:
W. H. CHAMBERLIN,
M. A. REEVE.