T. O. PERRY.

AIR COMPRESSOR.

APPLICATION FILED SEPT. 9, 1907.

928,326.

Patented July 20, 1909.

3 SHEETS—SHEET 1.

Fig. 1

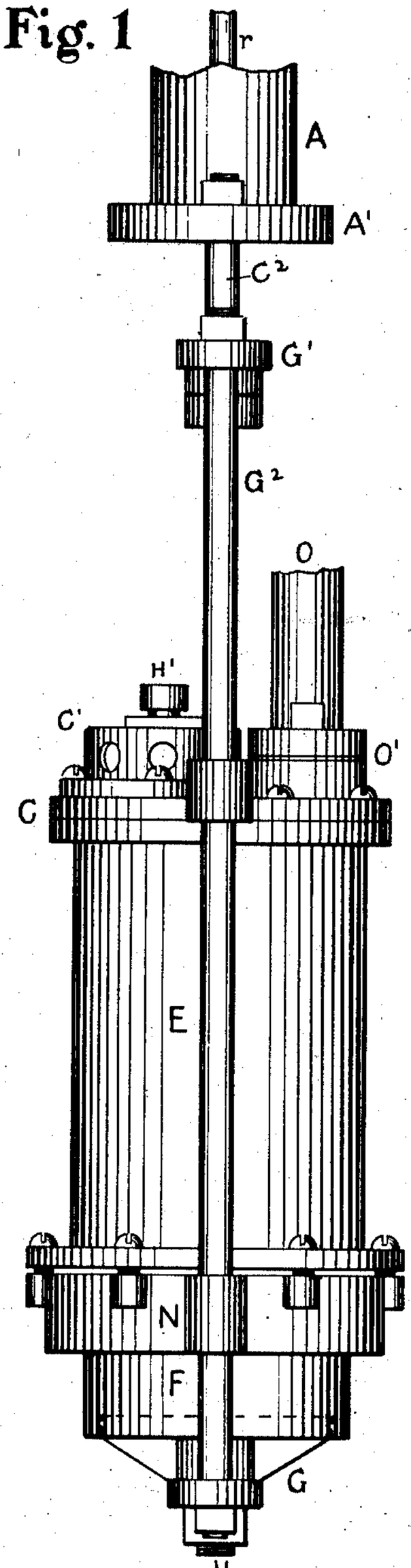
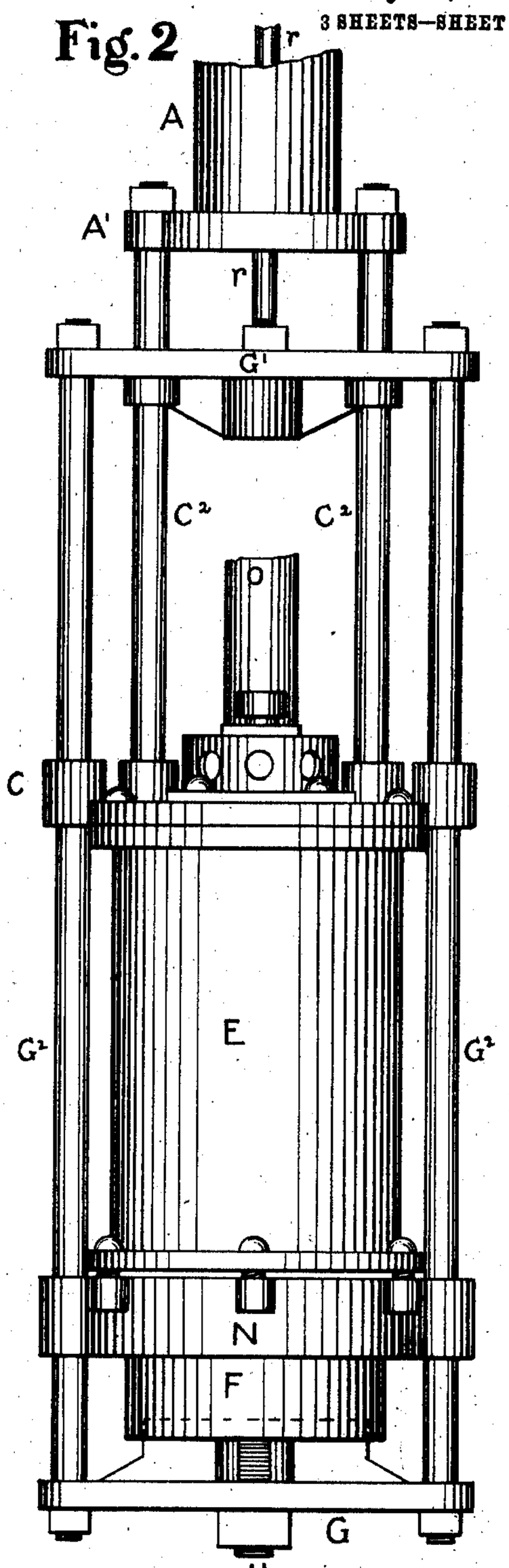


Fig. 2



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3 SHEETS—SHEET 2.

Fig. 3

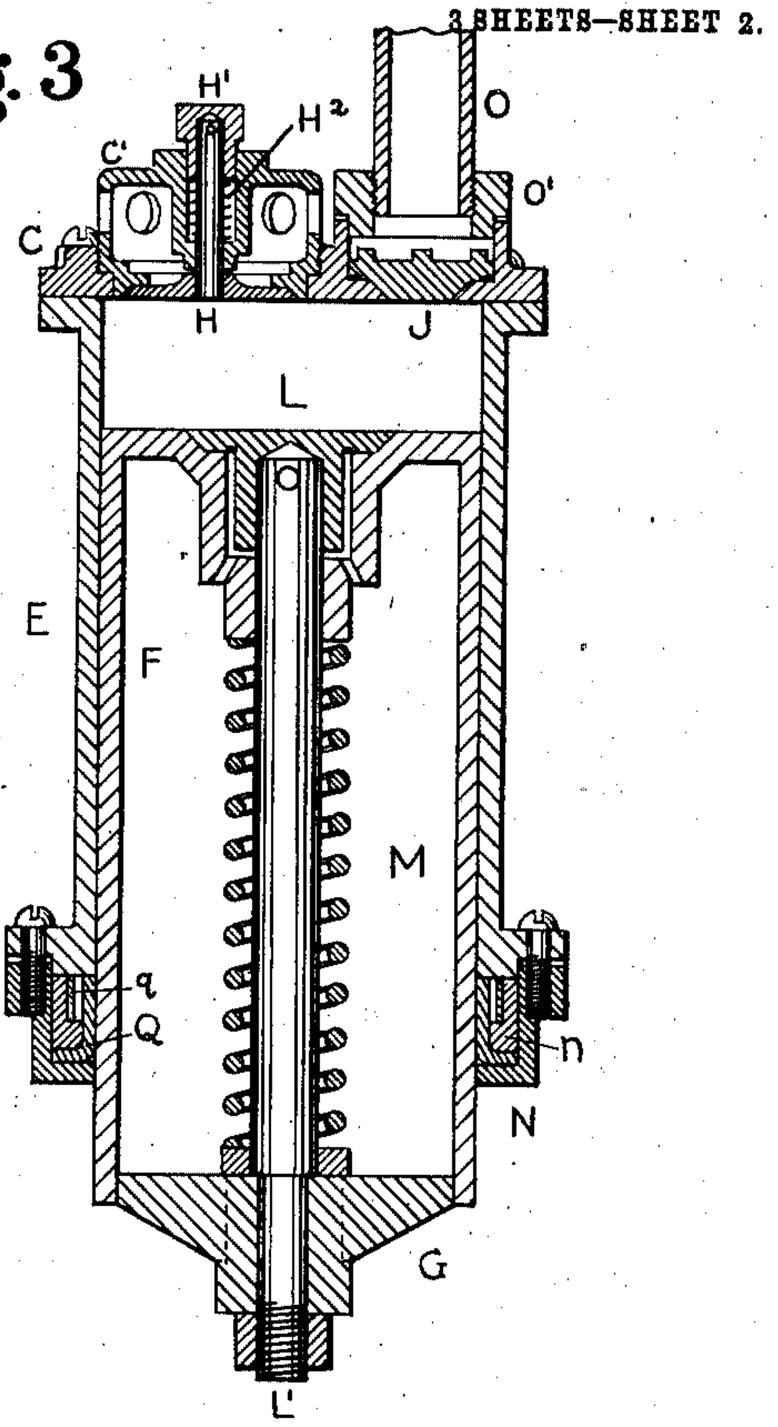


Fig. 4

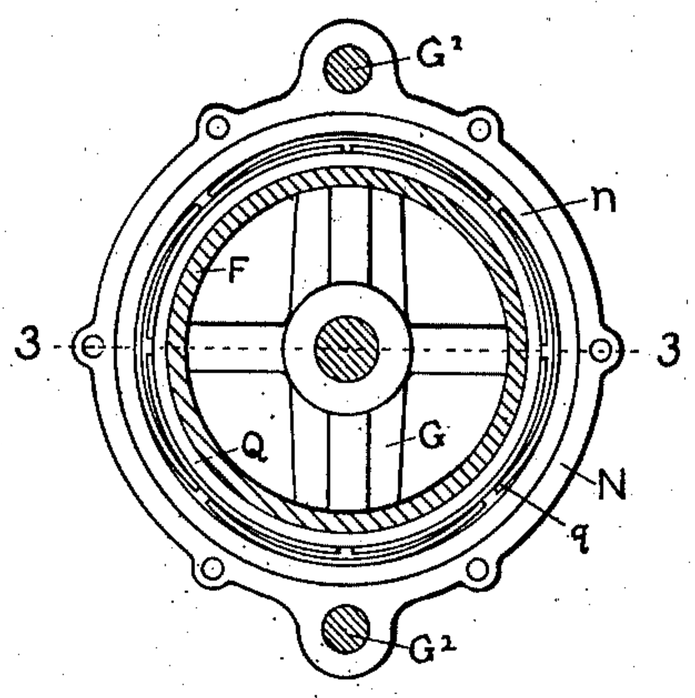
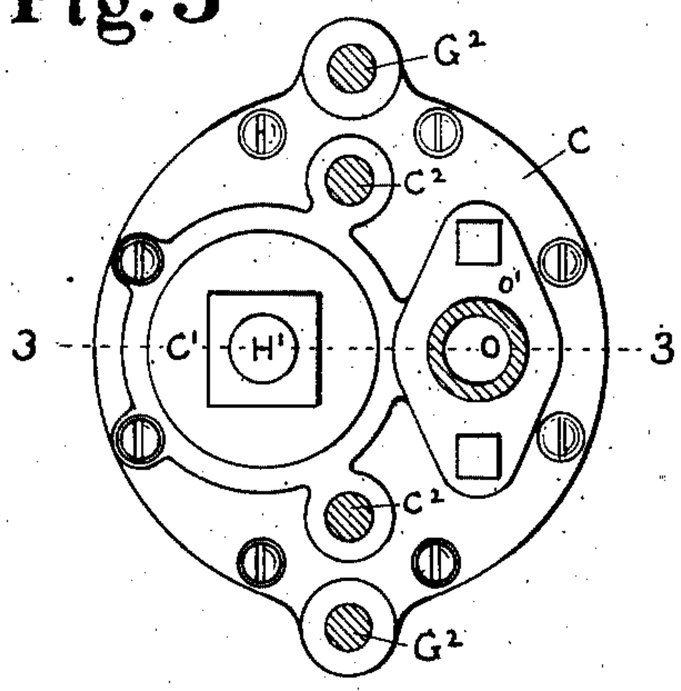


Fig. 5



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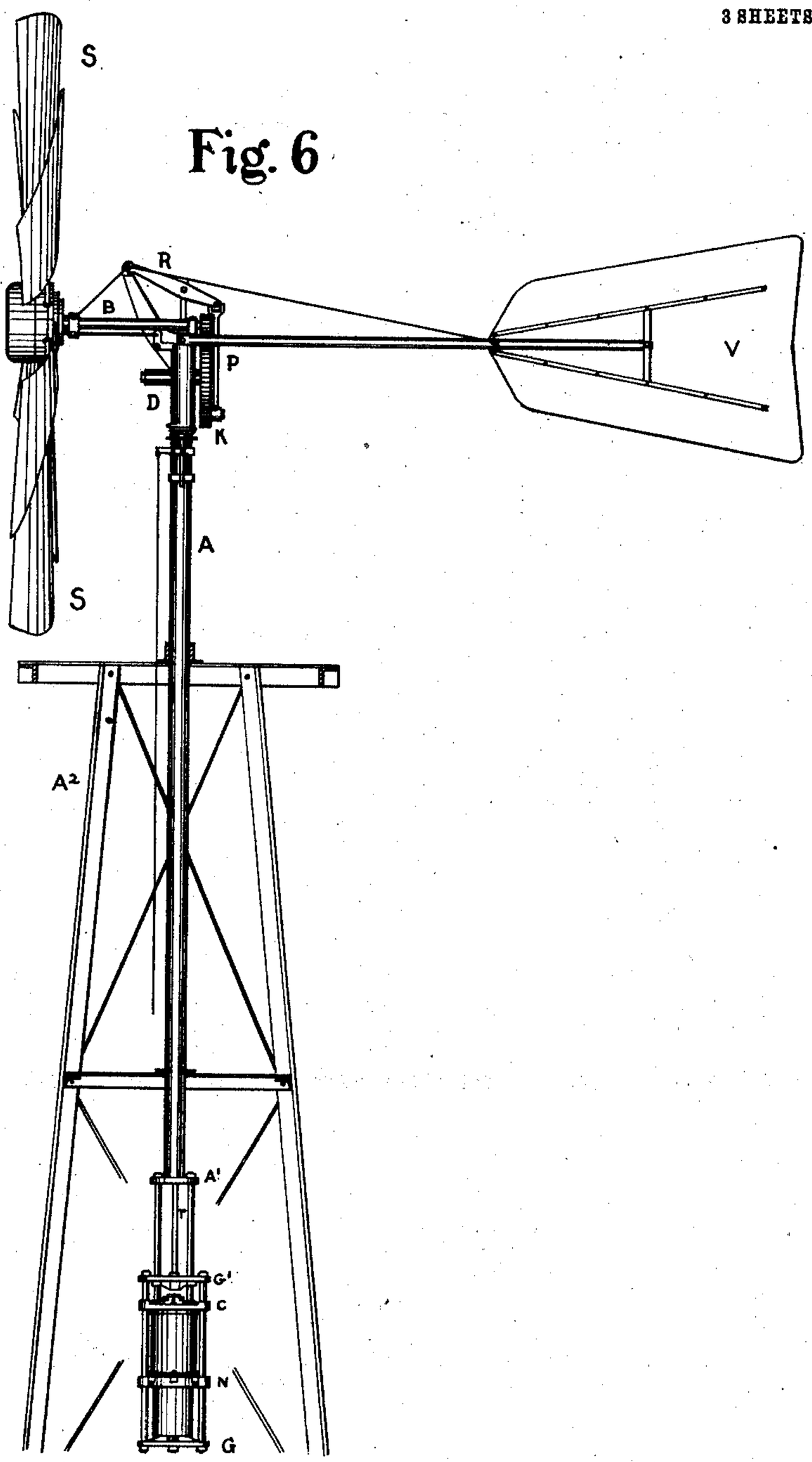
3 SHEETS—SHEET 3.

Fig. 6



WITNESSES:

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UNITED STATES PATENT OFFICE.

THOMAS O. PERRY, OF CHICAGO, ILLINOIS.

AIR-COMPRESSOR.

No. 928,326. Specification of Letters Patent. Patented July 20, 1909.

Application filed September 9, 1907. Serial No. 392,064.

To all whom it may concern:

Be it known that I, THOMAS O. PERRY, a citizen of the United States, residing at No. 5328 Prairie avenue, Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Air-Compressors, of which the following is a specification.

This invention relates to improvements in air compressors, especially when operated by wind power.

The objects of my invention are, first, to provide a safety valve which shall render over-compression and undue strains impossible, and second, to provide such means for supporting the compressor cylinder that distortion will not occur under normal strains. These objects I attain by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is an exterior side elevation of the air compressor and its supports; Fig. 2 is an exterior front elevation of the air compressor and its supports; Fig. 3 is a sectional elevation of the air compressor on the line 3 3 of Figs. 5 and 4; Fig. 4 is a plan of the plunger packing showing the plunger in section; Fig. 5 is a plan of the head or cap of the air compressor; and Fig. 6 is an elevation showing, on a reduced scale, how the air compressor is supported and operated when the motive power is a wind mill mounted on a tower.

Similar letters refer to similar parts throughout the several views.

The compressor cylinder, E, has exterior flanges at both its upper and lower ends. The cap, C, is secured to the upper end of the cylinder by screws entering the upper flange. The plunger, F, fits the interior of the cylinder E, loosely, is closed at its upper end, protrudes from the lower end of the cylinder, and carries at its lower extremity a cross-head, G. Plunger rods, G^2, rigidly connect the cross-heads with the drive-head, G′, which is adapted to reciprocate above the cap, C, and is centrally connected to the actuating rod, *r*, of the wind mill. This actuating rod, *r*, the windmill, B, D, K, P, R, S, V, and the supporting pipe, A, are the same as fully shown and described in my patent for windmill, No. 772,052, issued October 11th, 1904. A supporting plate, A′, is secured to the lower end of the pipe, A, which supports the windmill at its upper end. Supporting guide rods, C^2, pass loosely through the drive-head and rigidly connects the cylinder cap, C, to the supporting plate, A′.

Surrounding the plunger and drawn to the lower cylinder flange by screws is a clamping ring, N, having an interior flange underneath loosely fitting the plunger, and inclosing together with the cylinder end an annular packing space. An elastic cylindrical packing, Q, exteriorly flanged on its under side surrounds and presses against the plunger within the annular space. A packing ring, *n*, is interposed between the cylinder end and the exterior flange of the packing so that it binds the packing flange by tightening the clamping screws. Between the upper portions of the packing, Q, and packing ring, *n*, is a thin annular recess adapted to receiving packing-springs, *q*, which react between the packing ring and elastic packing. These packing springs are preferably arranged in two annular layers, one within the other, and each layer is made up of several thin, flat spring sections. Four spring sections are shown in each layer in Fig. 4. The spring sections are all under tension. These spring sections may all be nearly straight before being sprung into the annular recess, or they may be curved before insertion as suits best the tension required when in place. The packing may be made of leather or other yielding material. The upper side of the clamping ring, N, loosely incloses an annular shoulder on the end of the cylinder of the same external diameter as the packing ring, *n*.

The annular packing space is also adapted to receive other forms of packing such as are ordinarily used.

The cross-head, G, is not rigidly connected to the plunger, F, but is merely guided loosely in its open lower end and is carried rigidly by the tie rod, L′, whose upper end connects with a safety valve, L, which seats against and is guided in the upper closed head of the plunger. A powerful safety spring, M, surrounding the tie rod, reacts between the closed head of the plunger and the cross-head so as to hold the safety valve closed. The safety-spring should have sufficient tension to drive the plunger, without yielding, against any normal resistance, but it is designed to yield to abnormal resistance, such as might result from accidental clogging of the outlet, or undue compression of air, so as to relieve the excessive pressure by

letting the safety valve open. A very slight lifting of the safety-valve lets compressed air pass sufficiently to avoid dangerous pressure.

In the cylinder head is a check valve, J, opening outward, covered by a cap, O′, from which the outlet or delivery pipe, O, rises.

The intake valve, H, opens inward and is carried by and rests against a hollow cage, C′, which screws into the cylinder head to one side of the outlet. The guiding stem of the intake valve reaches up through the center of the cage and terminates in a knob, H′, attached so as to form a shoulder, beneath which a helical spring, H², coiled around the stem and resting in a recess of the cage, reacts to balance the weight of the valve more or less. The under side of the knob, H′, is guided in a recess, and its upper part is enlarged so as to limit the vertical movement of the intake valve. Around the periphery of the cage are openings for the passage of air.

While this invention is especially applicable to air compressors actuated by wind power, it may also apply to pumps for forcing other fluids, and may be used to advantage in connection with actuating motors other than windmills.

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

1. In an air compressor, the combination with a cylinder having intake and outlet valves, of a plunger or piston provided with a safety valve normally inoperative, a spring under tension holding said safety valve closed, and actuating connections adapted to act against the tension of said spring to drive said plunger during its compressing stroke, said spring having sufficient tension to resist all ordinary driving action of said actuating connections and yielding only under abnormal strains sufficiently to let air escape past said safety valve, substantially as herein set forth.

2. In an air compressor having a reciprocating part and stationary parts, the combination with intake and outlet valves, of a safety valve normally inoperative, a spring under tension holding said safety valve closed, and actuating connections adapted to act against the tension of said spring to drive said reciprocating part during compression of air, said spring having sufficient tension to resist all ordinary driving action of said connections and yielding only under abnormal strains to let air escape past said safety valve, substantially as herein set forth.

3. In an air compressor, the combination with intake and outlet valves, of a safety-valve, a spring under tension holding said safety valve closed, and actuating connections acting against the tension of said spring to open said safety valve whenever the strain on said actuating connections accidentally becomes abnormally great, substantially as herein set forth.

4. In an air compressor, the combination with a cylinder having intake and outlet valves, of a hollow plunger having its inner end closed, a safety-valve closing exteriorly against the closed head of the plunger, an actuating head guided loosely on the plunger and operatively connected to the safety-valve, and a safety-spring reacting between the actuating head and the plunger so as to hold the safety-valve closed and propel the plunger without yielding against the resistance of normal work, and yet yielding under abnormal strains sufficiently to open the safety-valve substantially as herein set forth.

5. In an air compressor, the combination with a plunger, or piston, and a cylinder having intake and outlet valves, of a safety-valve in said plunger, an actuating head operatively connected to said safety valve, and a safety spring reacting between the actuating head and the plunger so as to hold the safety valve closed and propel the plunger without yielding to the resistance of normal work, and yet yield under abnormal strains sufficiently to open the safety valve, substantially as herein set forth.

6. In an air compressor, the combination with a plunger or piston, and a cylinder having intake and outlet valves, of a safety valve in said plunger, an actuating head, and a safety spring adapted to close said safety-valve and resist the operative thrust of the actuating head, whereby the yielding of said safety spring under abnormal strain may open the safety valve, substantially as herein set forth.

7. In an air compressor, the combination with a plunger or piston, and a cylinder having a closed head against which air is compressed by the plunger, and intake and outlet valves, of a supporting plate, and supporting rods or pillars separating said closed head from said supporting plate to sustain the thrust of compression, substantialy as herein set forth.

8. In an air compressor, the combination with a plunger or piston, and a cylinder having a closed head against which air is compressed by the plunger, and an intake valve, of a supporting plate, and supporting rods or pillars separating said closed head from said supporting plate, and an outlet valve located in said closed head, substantially as herein set forth.

9. In an air compressor, the combination with a plunger or piston, and a cylinder having a closed head against which air is compressed by the plunger, of a supporting plate, and supporting rods or pillars separating said closed head from said supporting plate, and inlet and outlet valves located in said closed head, substantially as herein set forth.

10. In an air compressor, the combination with a plunger or piston, and a cylinder having a closed head against which air is compressed by the plunger, and intake and outlet valves, of a supporting plate, and supporting rods or pillars separating said closed head from said supporting plate, and a drive head guided on said supporting rods and adapted to actuate said plunger, substantially as herein set forth.

11. In an air compressor, the combination with a plunger or piston, and a cylinder having a closed head against which air is compressed by the plunger, of a supporting plate, and supporting rods or pillars separating said closed head from said supporting plate, and inlet and outlet valves, and accessories to said valves protruding from said closed head toward said supporting plate, substantially as herein set forth.

12. In an air compressor, the combination with a plunger or piston, and a cylinder having a closed head against which air is compressed by the plunger, and inlet and outlet valves, of a supporting plate having a central opening, supporting rods or pillars separating said closed head from said supporting plate, a drive head guided on said supporting rods and having operative connections with said plunger, and an actuating rod extending from said drive head through the central opening in said supporting plate, substantially as herein set forth.

13. In an air compressor, the combination with a plunger or piston, and a cylinder having a closed head against which air is compressed by the plunger, of a supporting plate separated by an interval from said closed head, inlet and outlet valves having accessories protruding into said interval, and connections between said supporting plate and said closed head adapted to sustain the compressing thrust of the plunger, substantially as herein set forth.

14. In an air compressor, the combination with a plunger or piston, and a cylinder having a closed head against which air is compressed by the plunger, and a supporting plate separated by an interval from said closed head, and inlet and outlet valves in the closed head of the cylinder, and connec- compressed between said actuating head and said closed head adapted to sustain the compressing thrust of the plunger, of an actuating head, a safety spring compressed between said actuating head and said plunger and adapted to yield only to abnormal actuating strain, a safety-valve in said plunger normally closed, and means whereby the yielding of said safety spring causes said safety valve to open, substantially as herein set forth.

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

THOMAS O. PERRY.

Witnesses:
JAS. A. TOWNSEND,
G. R. BROWN.