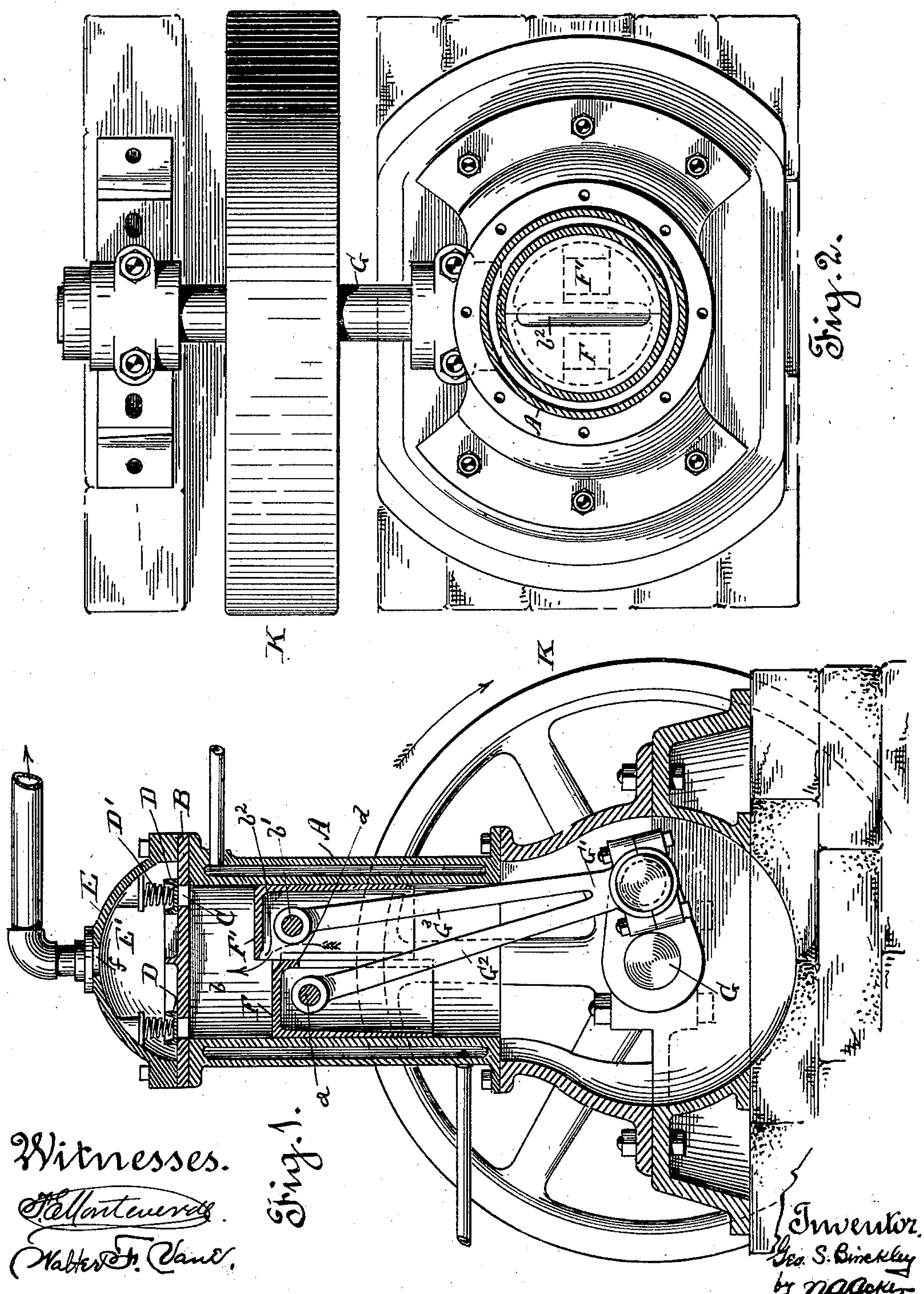
No. 671,044. Patented Apr. 2, 1901.

G. S. BINCKLEY.

AIR COMPRESSOR.

(Application filed June 27, 1900.)

(No Model.)



Witnesses.
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UNITED STATES PATENT OFFICE.

GEORGE S. BINCKLEY, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO WILLIS G. DODD, OF SAME PLACE.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 671,044, dated April 2, 1901.

Application filed June 27, 1900. Serial No. 21,818. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. BINCKLEY, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Air-Compressors; and I do hereby declare that the following is a full, clear, and exact description of the same.

The object of my invention is to provide an air-compressor by means of which the inlet of air to be compressed and the compression thereof within the compressing-chamber are accomplished through the medium of a sectional piston, the opening and closing of the air inlet or passage through the piston-head being controlled by the angularity of the actuating means for the sectional piston; also, to produce a cheap and inexpensive compressor capable of being run at a high speed and one having full volumetric efficiency.

In order to comprehend the invention, reference should be had to the accompanying sheet of drawings, forming a portion of this application, wherein—

Figure 1 is a vertical sectional view of the compressor in side elevation, and Fig. 2 is a cross-sectional top plan view of the same.

The letter A is used to indicate a water-jacketed cylinder into which the air is admitted for the purpose of being compressed. Said cylinder is preferably an open-bottomed one, its upper end being closed by the head B, which is fitted to the top of the cylinder. This head is provided with an annular outlet-opening C, normally held closed by means of an annular check-valve D, fitted to the upper side or face of the head B, so as to close the outlet-opening C. This valve is held down upon its seat by the pressure of spring or springs D′.

To the upper end of cylinder A is fitted the cover E, which forms a chamber E′, into which the compressed air is forced and from which it escapes through the outlet-opening *f* to any desired point. Within the cylinder works the piston, which is divided vertically through its center in the plane of the axis of the cylinder, so as to form two sections F and F′. Each section is complete in itself, forming, with its companion section, a perfect piston. These sections, which shall hereinafter be referred to as the "piston," slide within the cylinder A, and, as will hereinafter be explained, upon each other. Preferably the piston is in the form of a trunk-piston. This piston is connected to a crank-shaft G through the medium of the bifurcated connecting-rod G′, the arms G^2 and G^3 of said rod being connected, respectively, at points *a* and *b′* to sections F and F′ of the piston. The crank-shaft is driven so as to operate the connecting-rod to reciprocate the piston by any suitable means—as, for instance, by means of a belt working over belt-wheel K, secured to one end of the crank-shaft.

Owing to the change which takes place in the angularity of the arms G^2 and G^3 of the connecting-rod G′ during the revolution of the crank-shaft a double action is imparted to the piston—to wit, the function of a valve for controlling the admission of air into the compression-chamber *b* of the cylinder during one-half the revolution of the crank-shaft and a piston for the compression and final expulsion of the air from within the compression-chamber during the other half of the revolution of the said crank-shaft. The sectional piston when at its extreme stroke at the top of the cylinder will. have its two sections in line or the same horizontal plane. However, when set in motion by the crank-shaft turning, say, to the right, as illustrated in Fig. 1 of the drawings, the angularity of the arms of the connecting-rod will cause section F of the piston to advance ahead of the other section F′ in the downward movement of the piston. The section F moving below section F′ upon the downward stroke of the piston will cause a space or passage-way between the sections, thus providing an air-inlet opening between the sections of the piston, through which air is admitted into the compression-chamber. The air is drawn into the cylinder during said downward stroke of the piston, the same entering the compression-chamber through the air-inlet port b^2, formed by the advanced movement of section F of the piston. The port thus formed will continue open until the piston has completed its full downward stroke, when the arms G^2 and G^3 of the connecting-rod G′ will stand in vertical alinement and the sections

F and F′ of the piston in horizontal line, thus closing the port or air-inlet opening b^2. Upon the return or upward stroke of the pistons the same advance of the section F will take place, due to the angularity of the arms of the connecting-rod assumed during this stroke of the piston, the same being the reverse of that assumed during the downward stroke or movement of the piston. This change of angularity of the arms of the connecting-rod forces section F of the piston ahead or above the plane of section F′. However, during this advance of the section F the port or opening b^2 remains closed, due to the fact that the edge of the section F′ engages the downwardly-extending flange or lip *d*, attached to the under face of the section F at its front edge. The downward extension of this lip or flange is coextensive with the upward rise or movement of the section F. Consequently at no time during the upstroke of the piston is the section F′ below the flange or lip *d*. Hence no opening or port is created, as in the case of the downward stroke of the piston or where the upper face of section F is brought below the under face of section F′. The air thus admitted into the compression-chamber during the downward stroke of the piston is confined therein and compressed during the upstroke of the piston and cannot escape therefrom until the compressing force is such as to cause the uplift of the valve D, so as to permit the air under pressure to escape into the receiving-chamber E′, formed by the cover E. By continuing the revolution of the crank-shaft the piston will be forced to reciprocate downward and upward within the compressor-cylinder and the operation of taking in of the air into the cylinder and compressing the same within the compression-chamber will be repeated. It will thus be noticed that the air is admitted or drawn into the compression-chamber through the port or opening b^2 of the piston-sections during the downward stroke of the piston and compressed within the compression-chamber and expelled therefrom during the upward stroke of the said piston. The area of the inlet port or opening for the air is somewhat enlarged by cutting away the upper edge of section F and lower edge of section F′ of the piston. It will also be observed that the movement of the piston-sections is due to the change in the angularity of the arms of the connecting-rod, which is so regulated that the opening of the air-inlet port or opening occurs exactly at the beginning of the stroke of the piston's downward movement and closes exactly at the end of its said stroke or movement and remains closed during the entire upward stroke of the piston.

While I have described the invention as an improvement in air-compressors, it is obvious that the same is adapted for the compression of all kinds of fluids.

In the drawings forming a part of the present application I have illustrated the simplest form of a compressor; but I do not wish to be understood as confining myself to this form. The sectional piston may be packed in any suitable manner, and any suitable means may be employed for adjusting and taking up lost motion caused by wear, and, if so desired, two separate connecting-rods may be employed in the place of a single bifurcated connecting-rod.

Having thus described my invention, what I claim as new, and desire to secure protection in by Letters Patent, is—

1. In a compressor, the combination with the compressing-cylinder, of the piston working therein, said piston consisting of relatively movable sections, the drive-shaft for imparting reciprocating motion to the piston, and of a single connecting-rod connection between the drive-shaft and piston having separate pivoted connections with the respective sections, the movement of the piston-sections being dependent upon the angularity of the connecting-rod connection during the revolution of the drive-shaft.

2. In a compressor, the combination with the compressing-cylinder, of the piston working therein, the same consisting of relatively movable sections, the drive-shaft, and of connecting-rod connections between the drive-shaft and the piston-sections having separate pivoted connections with the respective sections, whereby the movement of the piston-sections is dependent upon the angularity of the connecting-rod connections during the revolution of the drive-shaft.

3. In a compressor, the combination with the compressing-cylinder, of the sectional piston working therein, each section of the piston being relatively independent of the other as to its movement, the drive-shaft for reciprocating the piston within the cylinder, and of connecting-rod connections between the drive-shaft and piston having separate pivoted connections with the respective sections whereby one section of the piston is moved in advance of the other section owing to the angularity of the connecting-rod connections during the revolution of the drive-shaft and upward-and-downward stroke of the piston.

4. In a compressor, the combination with the compressing-cylinder, of the piston working therein, said piston consisting of independently relatively movable sections, and of separate pivoted connections between the drive-shaft and the respective sections of the piston for imparting a reciprocating motion to the piston and moving its sections toward and from each other during the strokes of the piston, the movement of the piston-sections being dependent upon the angularity of the pivoted connections during the revolution of the drive-shaft.

5. In a compressor, the combination with the compressing-cylinder, of a piston consisting of relatively movable sections, said sections constituting the air-admission valve dur-

ing one stroke of the piston and the compressing-piston during the opposite stroke of the piston, the drive-shaft, and of the connecting-rod connections between each piston-section and the drive-shaft, the connecting-rod connections having separate pivoted connections with the respective sections so the sections advance toward and from each other upon the changed angularity of the rod connections during the revolution of the drive-shaft.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 14th day of June, A. D. 1900.

GEORGE S. BINCKLEY.

In presence of—

N. A. ACKER,

D. B. RICHARDS.