

(No Model.)

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N. W. WHEELER, Dec'd.

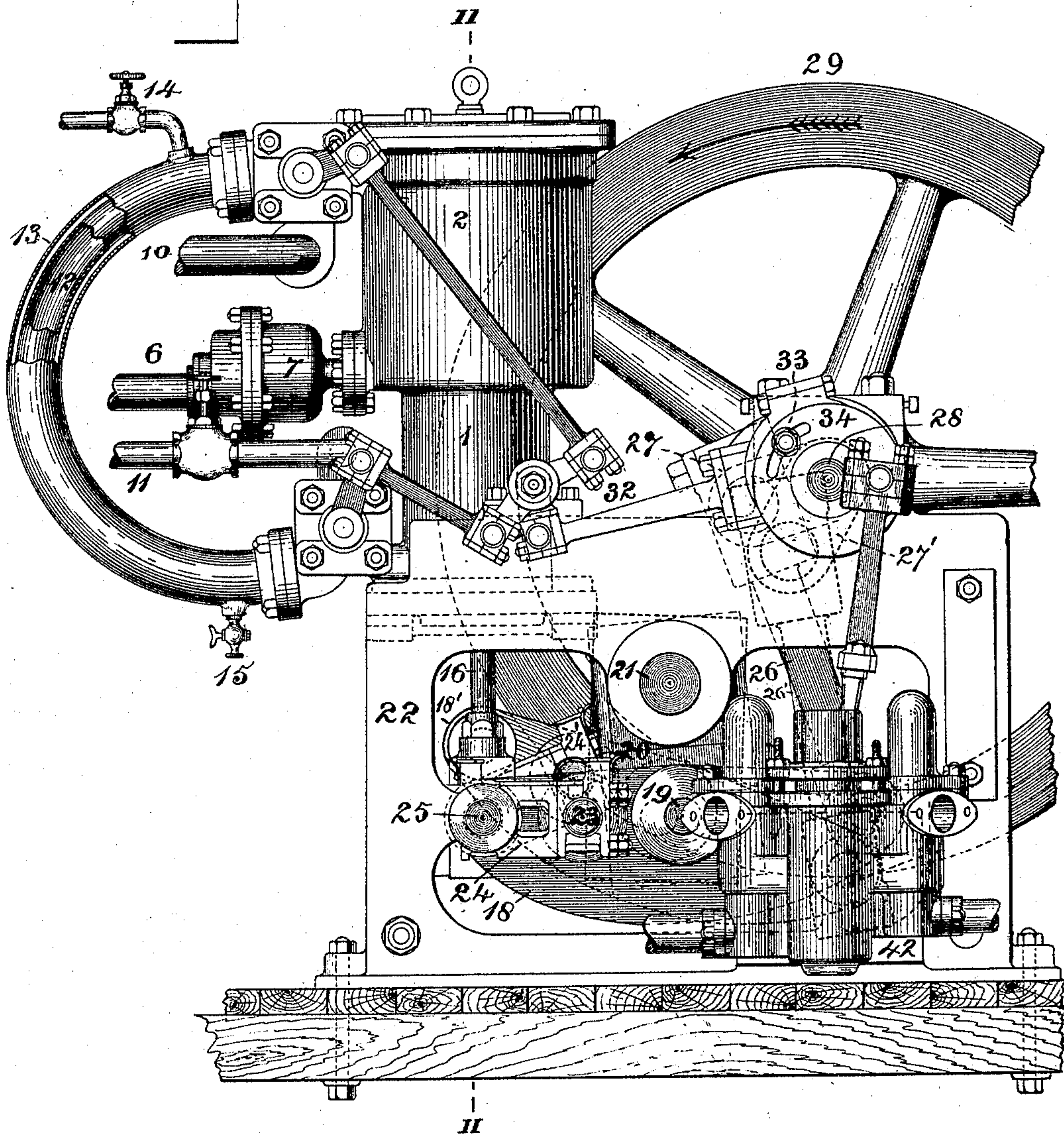
C. H. WHEELER, Administratrix.

GAS COMPRESSOR FOR REFRIGERATING APPARATUS.

No. 441,996.

Patented Dec. 2, 1890.

Fig. I.



Witnesses:

John A. Nelson.  
Wazie V. Bidgood.

Clara Hope Wheeler Admin<sup>x</sup> estate of  
Norman W. Wheeler Inventor (Dec'd)

By her Attorneys  
Knight Bros.



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N. W. WHEELER, Dec'd.

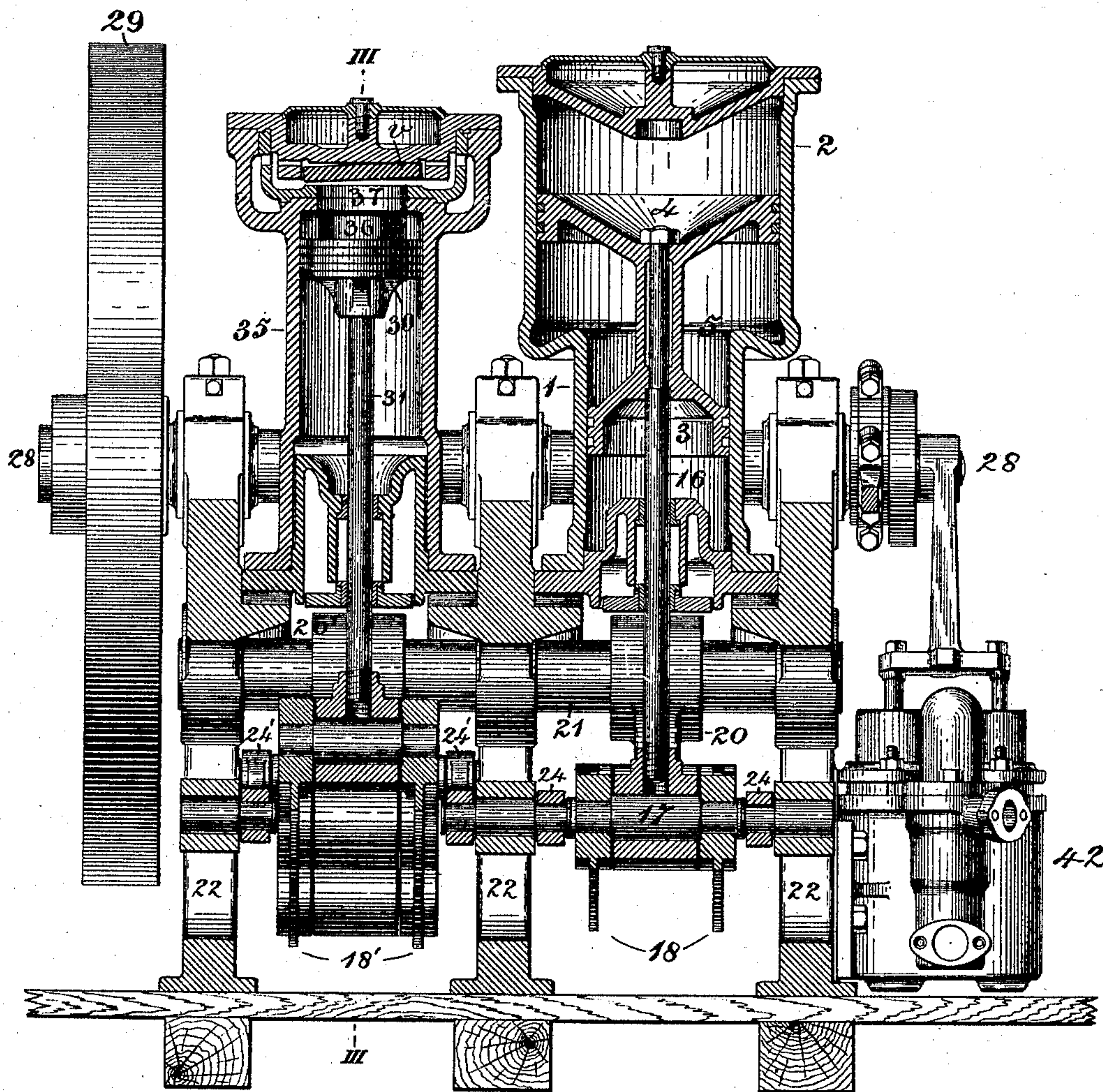
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Fig. II.



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(No Model.)

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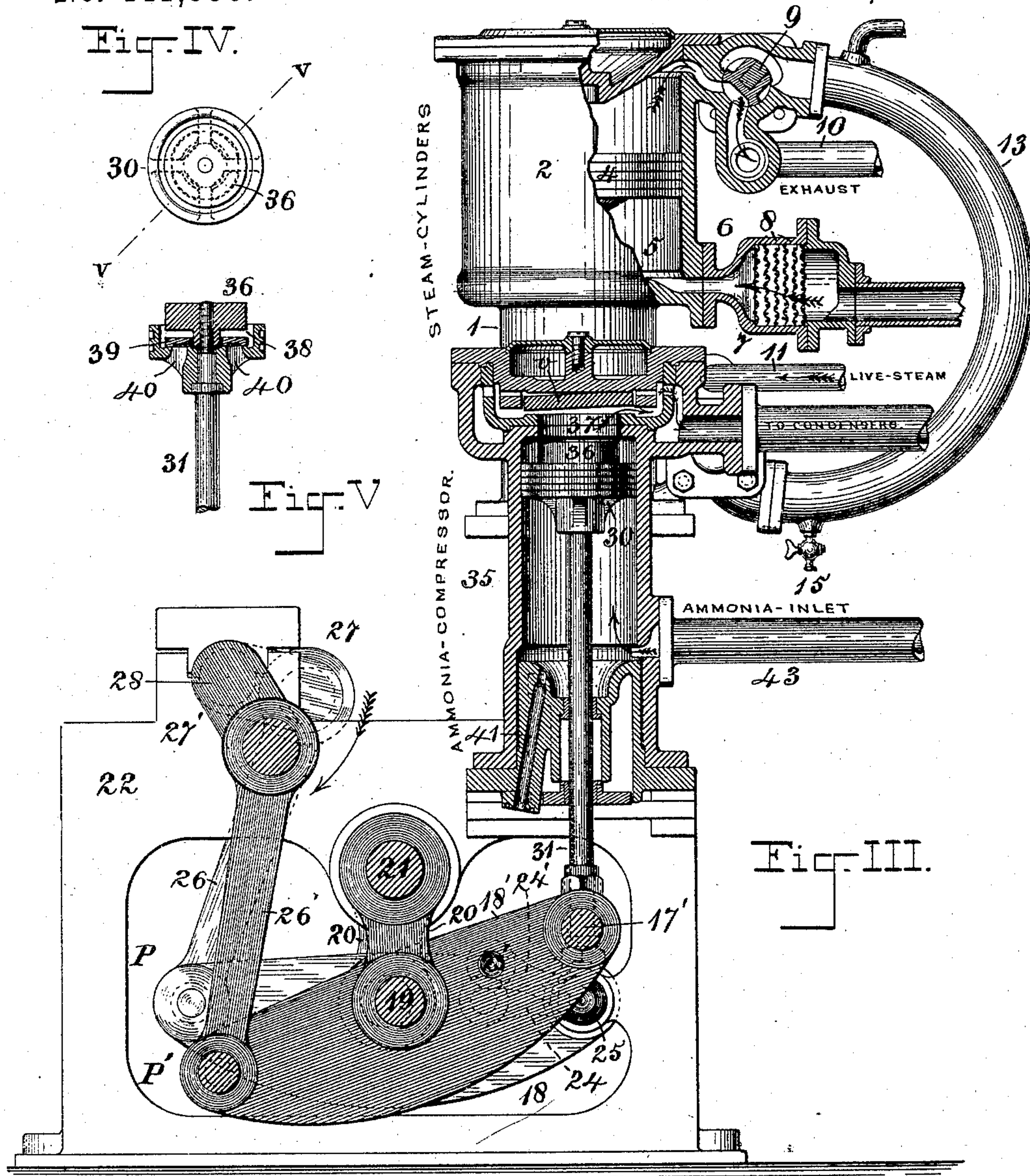
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Norman W. Wheeler Inventor (Dec<sup>d</sup>)

By her Attorneys  
Knight Bros



# UNITED STATES PATENT OFFICE.

CLARA HOPE WHEELER, OF NEW YORK, N. Y., ADMINISTRATRIX OF  
NORMAN W. WHEELER, DECEASED.

## GAS-COMPRESSOR FOR REFRIGERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 441,996, dated December 2, 1890.

Application filed December 16, 1889. Serial No. 333,943. (No model.)

*To all whom it may concern:*

Be it known that NORMAN W. WHEELER, deceased, late of New York, in the county and State of New York, did in his lifetime invent certain new and useful Improvements in Gas-Compressing Devices for Refrigerating Apparatus, of which the following is a specification.

The invention of said NORMAN W. WHEELER relates to a combination of steam-engine, a crank-shaft driven therefrom and having a fly-wheel, a crank on said shaft set at a suitable angular advance with respect to the engine-crank, a compression-cylinder, suitable rods and pitmen, and two swinging beams for the steam and compressor, respectively, forming parts of parallel motions, the construction and arrangement being such as to enable the entire mechanism to be placed in a confined space, such as between decks of a sea-going vessel.

The above, together with other features of improvement auxiliary thereto, is described and claimed in the following specification, and represented in the accompanying drawings, in which—

Figure I is a side elevation of an apparatus embodying said WHEELER'S invention. Fig. II is a section on the line II II of Fig. I. Fig. III is a section on the line III III of Fig. II, but with the steam-cylinder somewhat elevated and partially broken away for convenience of illustration. Fig. IV is a top view of the compressor-piston. Fig. V is a section on the line V V of Fig. IV.

The machinery is shown at the stage of its action at which the steam-piston is midway of its effective stroke, and at which the compressor-piston, having nearly completed its effective stroke, has so compressed the supernatant gas or vapor as to enable said vapor to lift the discharge-valve *v* and escape to the condensers.

1 represents the lower or initial, and 2 the upper or expansion cylinder of a single-acting compound steam-engine having a suitable double-headed piston 3 4. The portions of these cylinders between the two pistons constitute a chamber 5, which by means of a pipe or passage 6 communicates at any convenient

point with the open air. Each retrograde (descending) stroke of the piston 3 4 operates to contract the chamber 5, expelling a portion of the contained air and such steam as may have leaked past the piston-heads into the atmosphere through the passage 6. A forward (ascending) stroke of said piston, on the contrary, operates to enlarge said chamber, and air then enters through said passage to supply the partial void thus created. To obviate injurious cooling action of this influx of external air, said passage 6 has an enlargement or chamber 7, which is packed with numerous sheets of wire-gauze 8, which (being kept hot by the passage through them of the outgoing aeriform currents at each downward stroke of the piston 3 4) serve to heat up the current of external air, which enters the chamber 5 at each upward stroke of said piston. The entering air, becoming thus heated, does not injuriously cool the pistons and cylinders.

For the upward or effective piston-stroke the valve 9 is at the position shown in Fig. III, so as to exhaust into the atmosphere from the upper part of cylinder 2 through a pipe 10.

11 represents a pipe, through which at the proper instant live steam is admitted into the lower part of cylinder 1.

12 is a pipe, which, when the steam-piston 3 4 reaches the end of its effective stroke, (the live-steam passage being then closed,) opens communication from the lower part of cylinder 1 into the upper part of cylinder 2. In consequence of the largely-preponderating area of the upper piston-head 4 the entire piston is thus forced back to its initial position ready for another effective stroke. To prevent heat-waste, the pipe 12 is inclosed in a jacket 13, to which live steam is admitted through a cock 14.

15 represents a drip-cock for discharge of the water of condensation that collects in said jacket.

The rod 16 of the steam-piston is coupled by pivots 17 to one end of a peculiarly constructed parallel movement P, which comprises a swinging and rocking beam 18, which is fulcrumed at its mid-length by studs 19 in oscillating hangers 20, that depend from stud-shafts 21 on the frame 22. A stud 23 on the



said beam 18, located midway between the fulcrum 19 and the pivot 17, connects by link 24 with a stud 25 on the frame in the plane of the piston-rod. The effect of this arrangement is to restrict that end of the beam to which the piston-rod is coupled to motion in a right line coaxial with the cylinder notwithstanding that the said beam end vibrates in an arc with respect to its fulcrum 19. The said link, swinging and rocking beam, and oscillating hanger thus constitute component members of a parallel movement, whose compactness enables such apparatus to be got within dimensions which otherwise would be too restricted. The other extremity of the said swinging and rocking beam 18 is connected by pitman 26 with a crank 27 of crank-shaft 28, to which is fastened a heavy fly-wheel 29.

The above mechanism, which is connected with the steam-engine on the one hand, is, on the other hand, connected with precisely similar mechanism, which is connected with and drives the compressor-piston 30. The like parts in said similar mechanism are marked with the same numerals primed. The said similar mechanism will now be described. The said shaft 28 has a crank 27', whose angular distance (say forty-five degrees) in an advance of said steam-crank 27 is such as to secure the most effective action of the compressor-piston 30. The connections of the crank 27' with the said compressor-piston are, as above already stated, a precise duplication of those which connect the said crank 27 with the steam-engine piston 34—that is to say, there is a like parallel movement P', which comprises a precisely similar swinging and rocking beam 18', which enables direct coupling of such beam 18' to the compressor-piston rod 31, through the medium of a pitman 26', which has the same guiding action on the compressor-piston rod as the parallel movement P has upon the steam-engine piston-rod, the only difference being that whereas the steam-piston drives its said parallel movement P, the compressor-piston 30 is driven by its parallel movement P', which in turn derives its motion through the crank-shaft and its connections from the same steam-piston. The steam and exhaust valves, which are oscillating ones of a familiar type, are driven by suitable rod-and-crank connections 32 from an eccentric of the usual form having adjustable attachment 33 to collar 34 on the crank-shaft. The compressor-piston 30 and its inclosing-cylinder 35 are so formed relatively to one stroke that the piston at each extremity of its stroke nearly fits and fills the interior of that end of the cylinder, so as to (aided by the lubricant) completely expel the ammoniacal contents preparatory to its return-stroke. With this object in view the nut 36, that attaches the piston 30 to the rod 31, is of such shape and dimensions as at the end of the upstroke to fill or nearly fill the exit-port 37. A shoulder

38 of said nut serves as a stop to the lift of piston-valve 39.

40 are ports through which the ammoniacal vapor flows into the upper part of cylinder 35 at each retrograde stroke of the compressor-piston.

The ammoniacal vapor enters the compressor-cylinder through a pipe 43.

41 represents an orifice, which, when the apparatus is in use, is occupied by the tube through which lubricant is injected into the compressor-cylinder.

42 represents pumps worked from the crank-shaft 28, of which one circulates the cold water through the condensers and the other the brine of the brine-circuit.

The invention has been described more especially for and is here shown as applied to a single-acting compound steam-engine and a single-acting compressor-cylinder, but may be applied to an arrangement of double-acting engine, operating in connection either with a double-acting compressor or with a pair of alternately-operating compressors; or a single steam-cylinder and piston, either double or single acting, may be used instead of the form here shown.

While especially designed for and here described in connection with a refrigerating apparatus, the said devices may be employed in apparatus for compression of air or other aeriform bodies.

For parts shown or specified herein and not claimed reference is made to another application for patent for invention of the said Wheeler, Serial No. 330,697.

Having described the invention of the said NORMAN W. WHEELER, what is claimed as new and useful therein is—

1. In a gas-compressing apparatus, the combination of the following elements, to wit: a steam-engine piston and a compressor-piston positively connected the one to the other by the two parallel movements P P' and by two cranks on a common crank-shaft, of which the crank connected with and operating the compressor movement P' is set at the described angular advance of the crank, which is operated by the steam-engine movement P, said crank-shaft having a fly-wheel, and said cranks being connected to their respective movements by pitmen, the whole being combined and operating substantially as and for the purposes set forth.

2. In the transmitting mechanism of a gas-compressing apparatus, the combination of two identically-constructed parallel movements, of which each comprises a swinging and rocking beam suspended from the frame by oscillating hangers, said beam being connected at one end by a pitman to a common crank-shaft through cranks placed at the described angular separation and at the other end to the rods of the respective motor and driven pistons, said beam at the end where so connected being coupled to the frame by a link, as and for the purposes set forth.



3. In a gas-compressing apparatus for use in confined spaces, the combination of two connected parallel movements, of which each comprises a swinging and rocking beam fulcrumed on the lower end of oscillating hangers or pendants and pivoted midway between its fulcrum and its point of connection with the piston-rod to a link or arm whose other extremity is pivoted to the frame, as and for the purposes set forth.

4. The parallel movement for steam and like engines of a gas-compressing apparatus consisting of the combination of a swinging

and rocking beam fulcrumed at its mid-length in oscillating pendants or hangers pivoted to the frame, and which beam is (midway between its fulcrum and its point of connection with the piston-rod) pivoted to a link or arm whose other extremity is pivoted to the frame, substantially as set forth.

CLARA HOPE WHEELER,  
*Administratrix of Norman W. Wheeler, deceased.*

Witnesses:

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