(No Model.)

2 Sheets—Sheet 1.

W. H. BARTEL & W. A. LEWIS.

ROTARY AIR PUMP.

No. 561,192. Patented June 2, 1896.

Fig. 1.

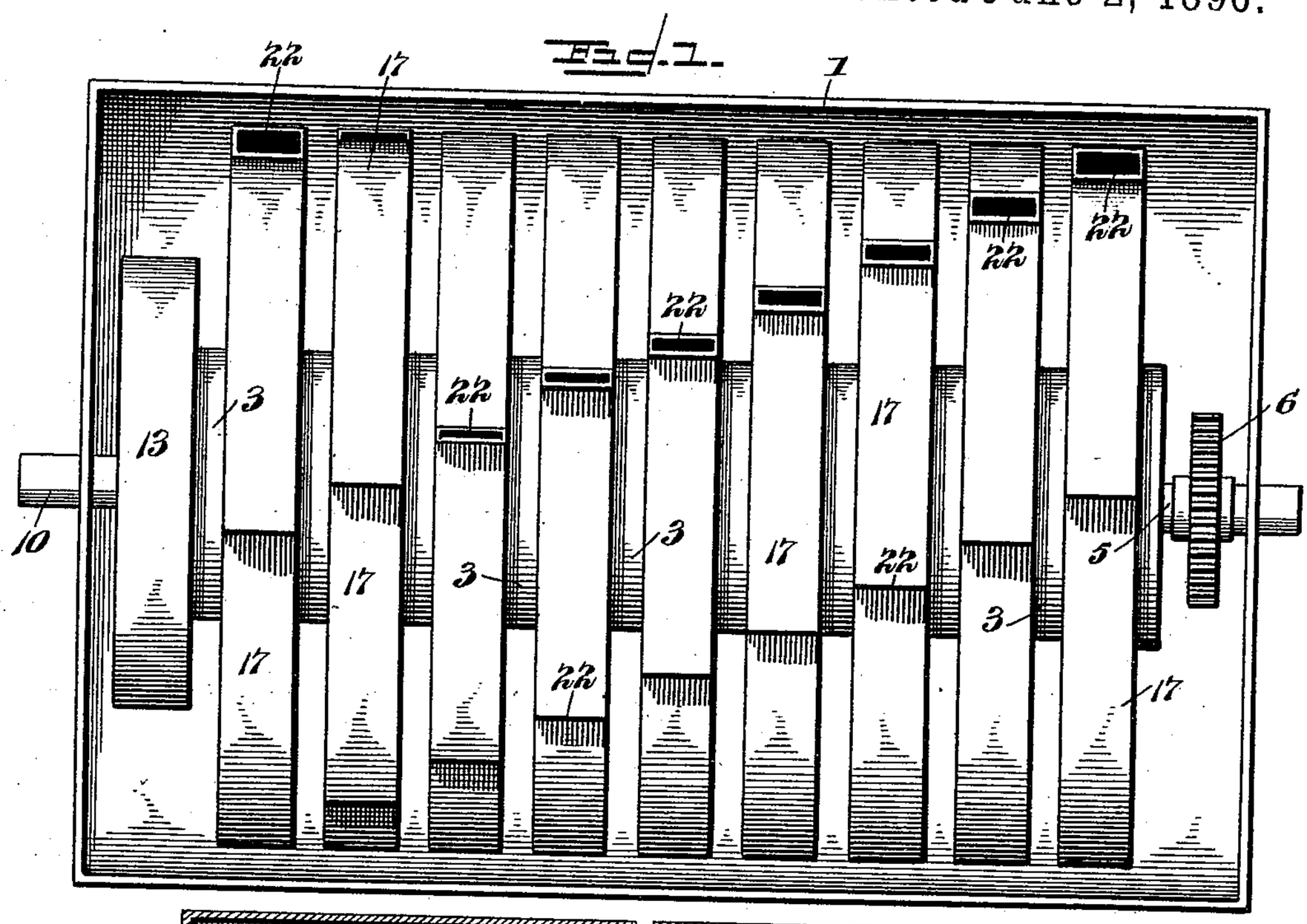

Fig. 2.

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Fig. 3.

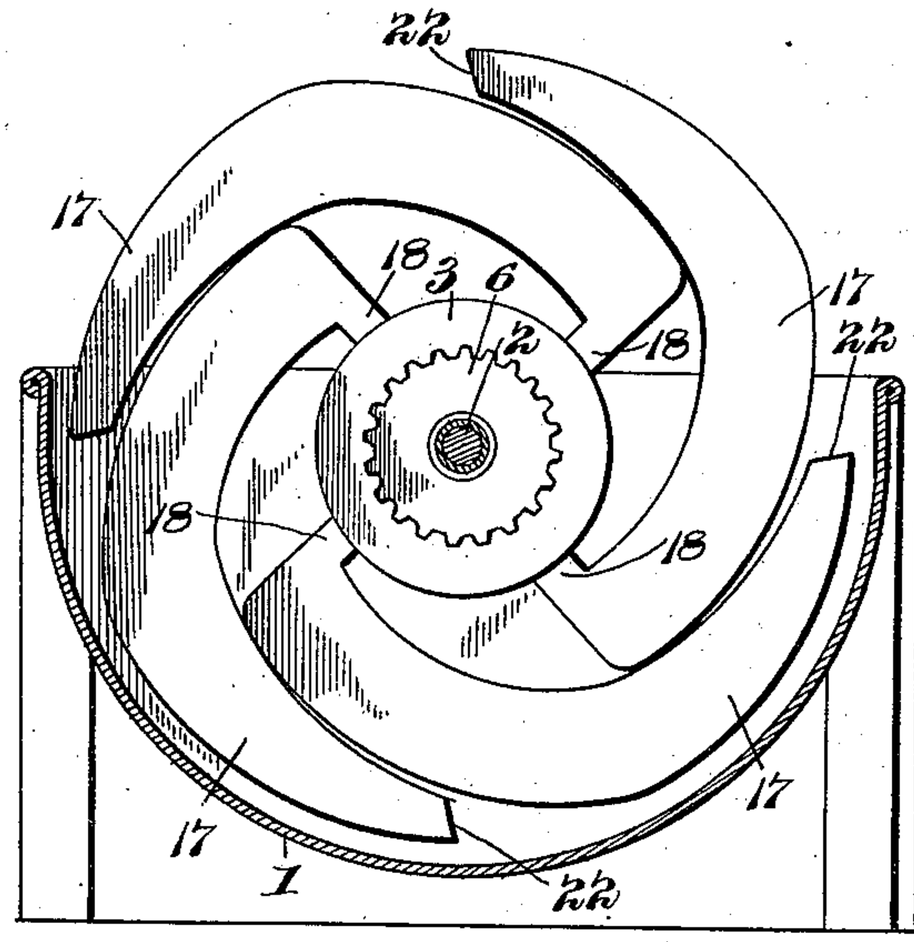


Fig. 4.

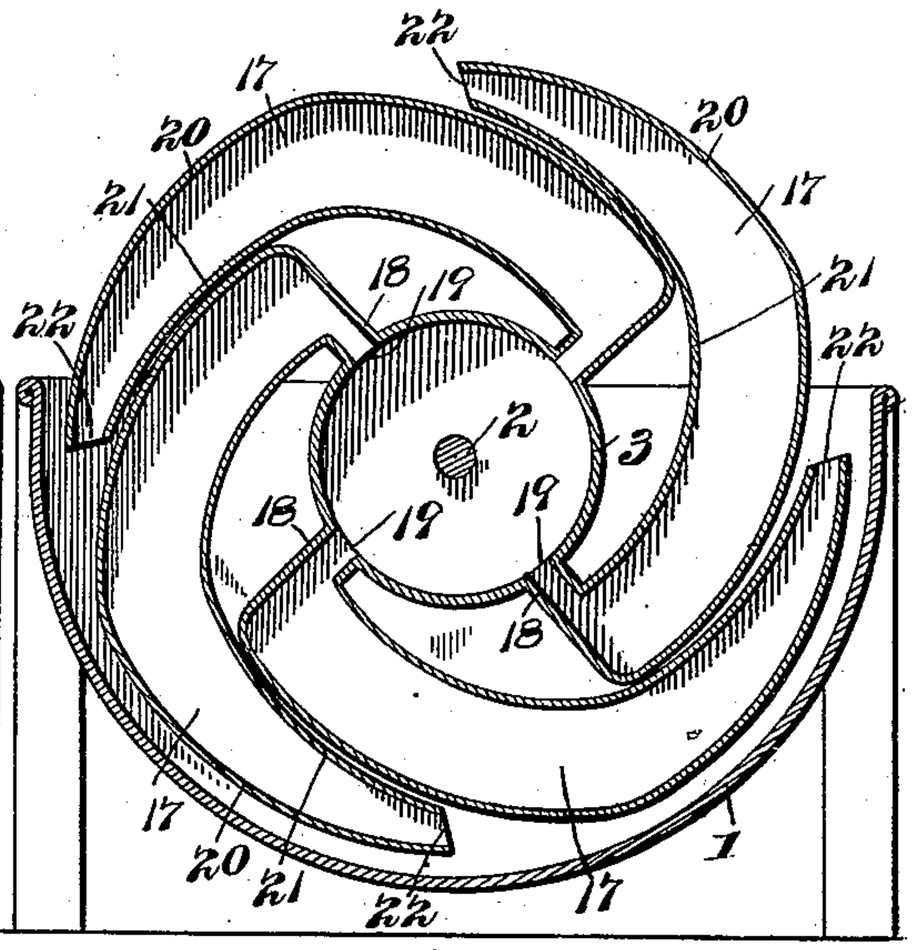
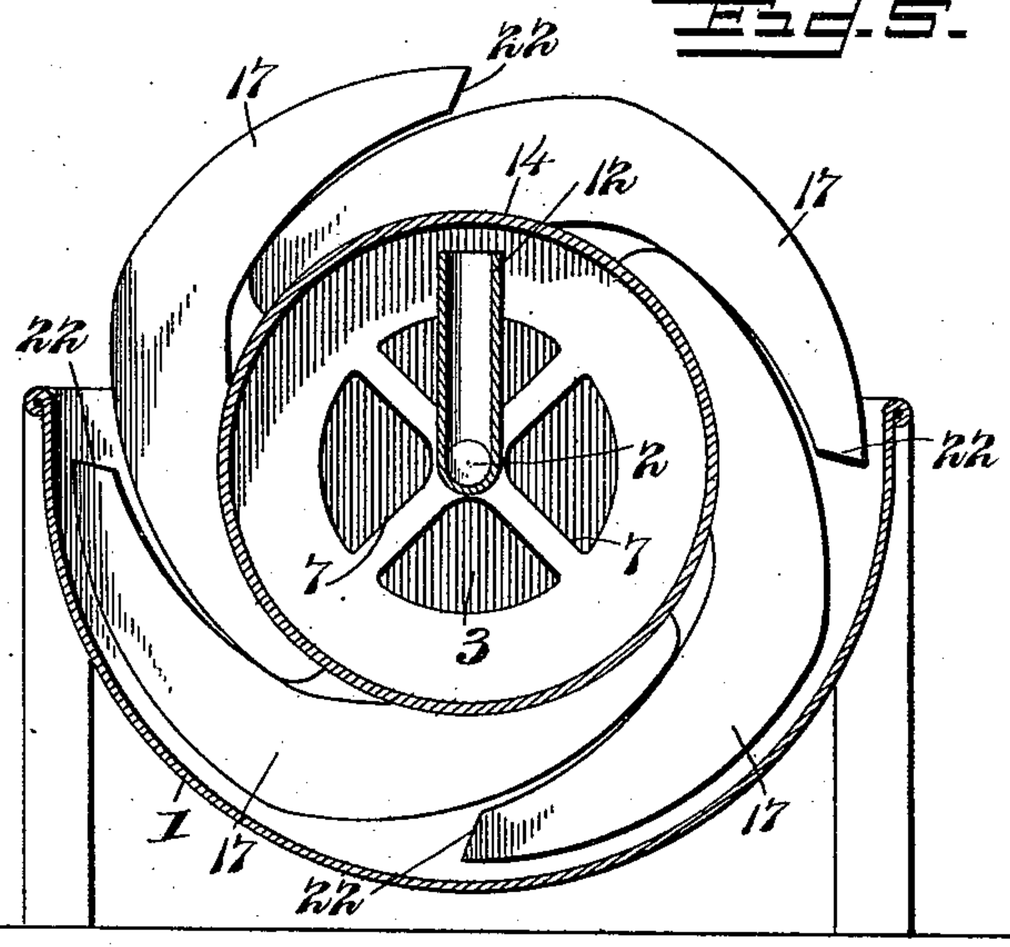


Fig. 5.



Witnesses
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G. H. Maxwell.

Inventors
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By their Attorneys, William A. Lewis
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UNITED STATES PATENT OFFICE.

WALTER H. BARTEL AND WILLIAM A. LEWIS, OF PORTLAND, OREGON.

ROTARY AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 561,192, dated June 2, 1896.

Application filed September 19, 1895. Serial No. 563,013. (No model.)

To all whom it may concern:

Be it known that we, WALTER H. BARTEL and WILLIAM A. LEWIS, citizens of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Rotary Air-Pump, of which the following is a specification.

Our invention relates to air-pumps, particularly to those that compress air by means of the rotation of convoluted air-channels or receiving-arms.

Our object is to provide improved means by which a continuous current of air may be forced at uniform pressure through a pipe and without the possibility of the leakage of any air. The rotary arms, which gather in and compress the air, rotate in a water-tank and are provided with contracted ends, whereby a minimum amount of water is taken up and the air is effectually compressed, and yet at the same time a water seal is provided for all the joints and moving parts.

Our pump is arranged to be driven by any well-known power, as a weight or spring, and is preferably located to receive out-door air and to force the same through refrigerating-pipes or through a medicated bath for use in the home for cooling the living-rooms or in a hospital or sick-room. Our improved pump is, however, adapted to a wide variety of other uses.

To these ends our invention consists in the novel features of construction and details and combinations of parts hereinafter set forth by description and claims.

In the accompanying drawings, Figure 1 is a top plan view of our invention. Fig. 2 is a detail fragmentary horizontal section. Fig. 3 is a vertical cross-section through the tank, showing the driving-wheel and revolving parts in end elevation. Fig. 4 is a similar view through the convoluted arms. Fig. 5 is a vertical cross-section taken through the air-receiver.

Reference-numeral 1 designates the tank, which is semicylindrical in form and properly supported rigidly at each corner. Longitudinally of this tank 1 the revolving portion of the pump is mounted on a horizontal shaft 2. Concentric to said shaft is the drum or air-cylinder 3, which is closed at the driving end by a disk-cap 4, which is centrally provided with an outwardly-extending collar-bearing 5, snugly fitting around the shaft and carrying at its outer end the drive-wheel 6, keyed or otherwise fixed thereto. At its opposite or discharge end the air-cylinder 3 is open and provided with an open spider end 7, centrally perforated to provide a journal-bearing 8 for shaft 2. The adjacent extremity of said shaft rests in the socket end or extension 9 of the air-discharge pipe 10. This pipe 10 is provided with a vertical extension 12, for a purpose described presently, which is located within the air-receiver 13, and extends upwardly nearly to the periphery thereof. Air-receiver 13 is cylindrical, having parallel sides 14 and 15, the former being concentrically perforated to receive the adjacent end of the air-cylinder 3, to which it is soldered or otherwise integrally secured, and the latter side 15 being also concentrically perforated to provide a small annular opening 16 around the horizontal portion of the air-pipe 10 for the discharge of the compression-water.

The air-compressing arms 17 are secured radially to the air-cylinder 3 in parallel planes perpendicular to said cylinder. There are preferably four arms 17 in each circle or plane, and these are convoluted or bent over on each other in the direction of revolution and nested snugly against each other, so as to form substantially a circle with their outer curved walls. The corresponding arms 17 of the successive circles or planes thereof are arranged longitudinally of the air-cylinder in staggered or spiral relation—that is to say, each successive arm 17, longitudinally to the right, as shown, is attached to the cylinder at its inner end slightly in advance of the preceding arm 17 to the left. This of course may be reversed, and the spiral arrangement may run in the opposite direction around the cylinder 3.

The air receiving and compressing arms 17 are all precisely similar in shape and are of special and peculiar form, by means of which we attain greatly-superior results. Each arm is hollow and is rectangular in cross-section and of the same lateral width throughout its length, its sides being parallel. At its inner end it is truncated obliquely and secured to the cylinder 3 by a narrow neck 18, fitted

around and secured to a rectangular slot 19, formed longitudinally in the circumferential wall of said cylinder. This neck 18 is slightly out of radial alinement with the cylinder, so as to form an obtuse angle with the top wall 20 of the arm. This top wall 20 is bent over approximately in the line of an involute from the cylinder for about half of its length and is thence continued to its end in the line parallel to the air-cylinder 3. The bottom wall 21 of the arm is bent throughout its entire length approximately in the line of the involute. This results in said walls 20 and 21 being substantially parallel to each other for about half their length and then converging therefrom toward their outer ends. Wall 21 terminates short of wall 20, so as to form an overhanging mouth 22.

The result of the above-described formation of the arms 17 is that each arm forms a sort of wall or dam in the path of the following arm, so that when they plunge through the water in the tank it prevents to some extent the water from being caught up by the mouth 22 of the said following arm. The gradually-enlarged portion extending from the narrow mouth 22 produces superior results, and the air banking up in the inner end of the enlarged chamber is forced through the narrow slot 19 under considerable pressure into the cylinder 3. Thus the form of the convoluted air-channels in itself compresses the air and drives it into the cylinder as the whole is revolved, thereby not requiring the rush of water behind the air to compress it, as is ordinarily the case in the common air-pumps of this type.

The operation of our improved air-pump is as follows: The cylinder and arms are revolved forwardly on the stationary shaft by means of power applied to the drive-wheel 6. As the arms pass over above the tank the air is caught by the mouths 22 and rushes into the arms 17. As the arms continue to revolve and plunge into the water in the tank a water seal is formed thereby and a slight amount of water enters the arms behind the air and forces the same completely through the neck 18 into the cylinder 3. Here the mingled air and water is driven by the continued entrance therein of more air and water into the air-receiver 13. The water at once rushes out of the annular opening 16, but the air is prevented from passing therethrough by reason of the fact that the water in the tank immerses said opening completely. The air therefore rises into the upper portion of the air-receiver and finds an outlet through the extended end 12 of the air-discharge pipe 10.

It is not necessary that our pump should be tightly covered; but a loose perforate cover sufficient to exclude foreign matter is sufficient and is preferable.

All the moving parts are protected by the water seal, so that the danger of air-leaking joints is reduced to a minimum.

The spiral arrangement of the air-channel arms insures a steady unintermittent stream of air at uniform pressure, because some one of the arms is always just entering the water.

Changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

What we claim is—

1. In a rotary air-pump, the combination with the air-cylinder, of a series of hollow arms joined to and communicating with the cylinder and disposed in parallel planes perpendicular to and ranging spirally about the said cylinder, substantially as specified.

2. In a rotary air-pump, the combination with the air-cylinder, of a series of hollow arms disposed spirally about the cylinder in parallel planes perpendicular thereto, each arm having the form of an involute and truncated at its inner end, and having connection with the cylinder by a narrow neck, and having its outer end contracted and overlapping the rear portion of the preceding arm, substantially as shown.

3. In a rotary air-pump, the combination of an air-cylinder horizontally mounted and provided with a plurality of curved radial air-compressing arms joined thereto in spiral order, each arm comprising a narrow inner neck, parallel sides and curved top and bottom gradually approaching each other at their outer ends and involutely curved from said cylinder, an air-receiver secured concentrically to the open end of said cylinder and provided in its outer side with a central aperture surrounding the discharge-pipe, and a discharge-pipe having an upturned end within said receiver, substantially as described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

WALTER H. BARTEL.
WILLIAM A. LEWIS.

Witnesses:
F. S. FIELDS,
B. F. FULTON.