

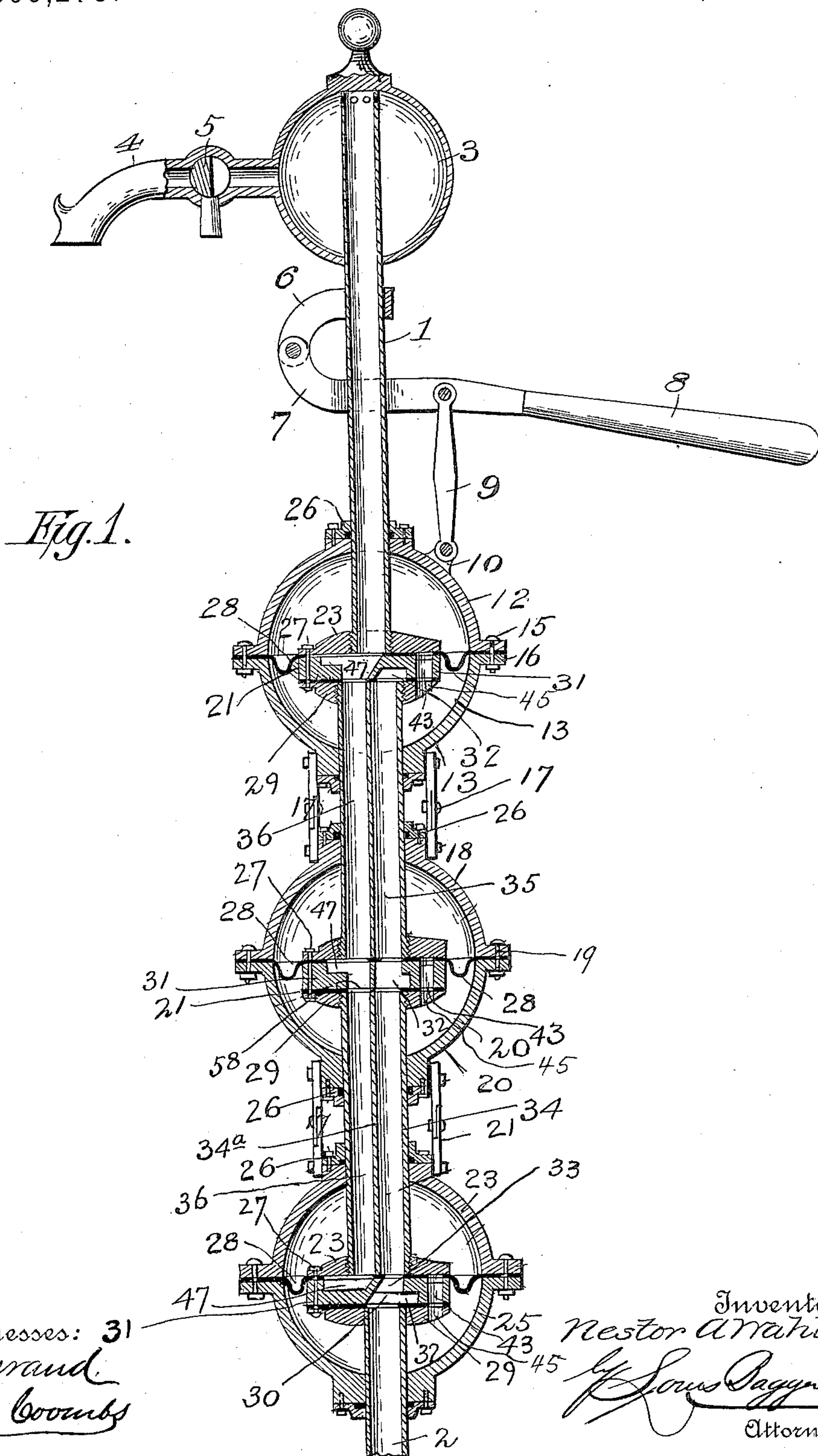
(No Model.)

3 Sheets—Sheet 1.

N. A. WAHTOLA.
DIAPHRAGM PUMP.

No. 599,273.

Patented Feb. 15, 1898.



Witnesses: 31
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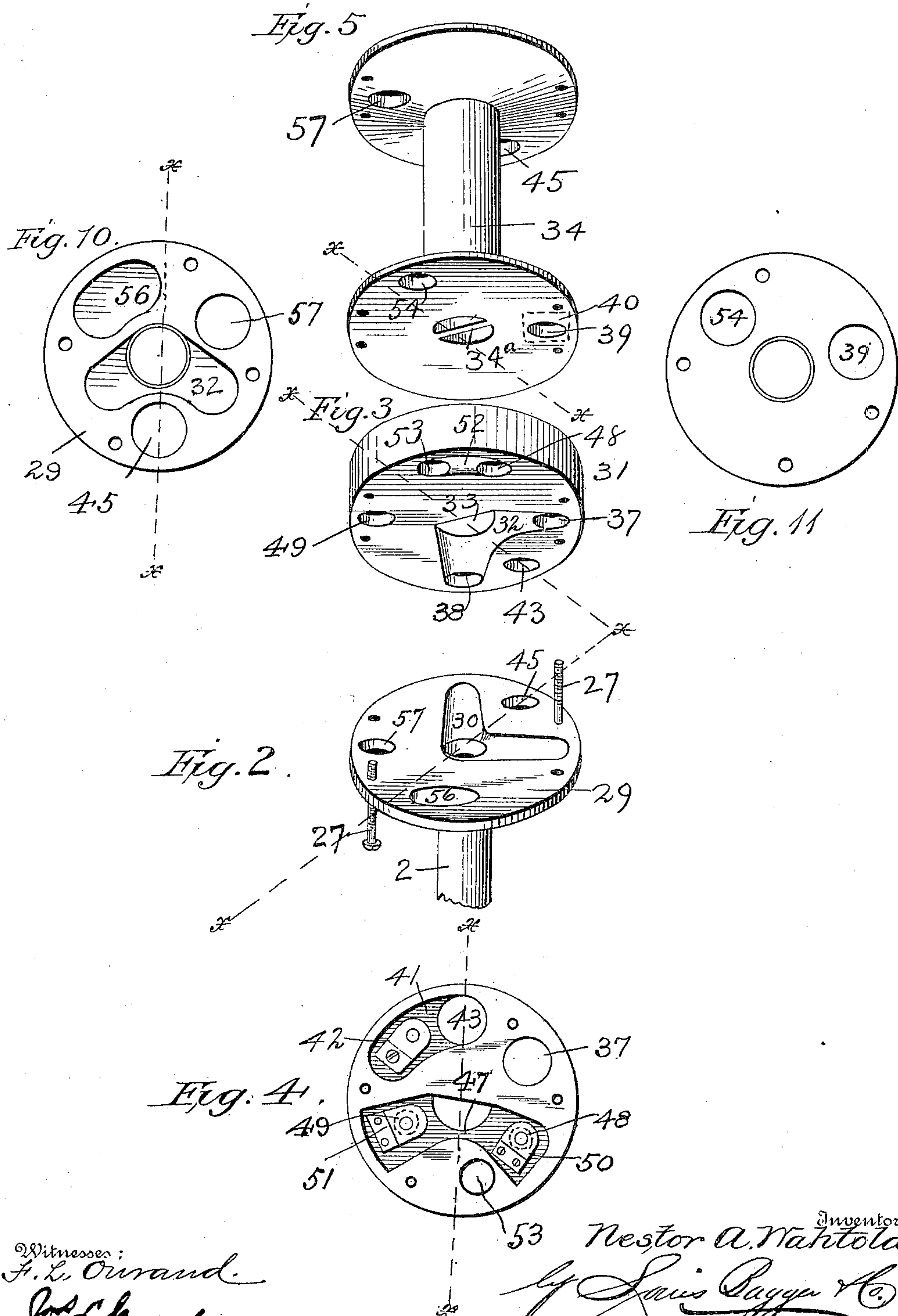
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3 Sheets—Sheet 2.

N. A. WAHTOLA.
DIAPHRAGM PUMP.

No. 599,273.

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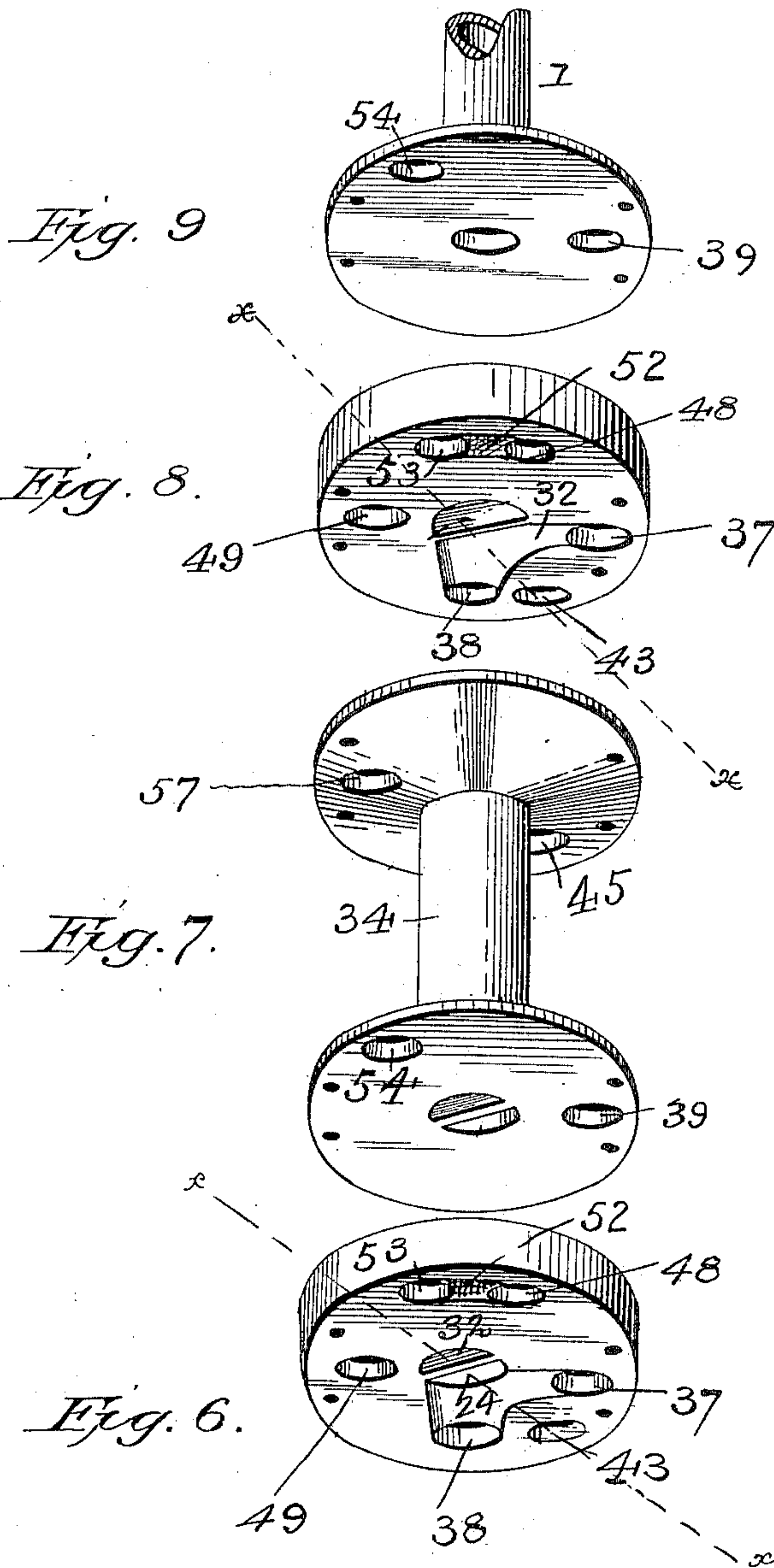
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3 Sheets—Sheet 3.

N. A. WAHTOLA.
DIAPHRAGM PUMP.

No. 599,273.

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UNITED STATES PATENT OFFICE.

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DIAPHRAGM-PUMP.

SPECIFICATION forming part of Letters Patent No. 599,273, dated February 15, 1898.

Application filed July 17, 1897. Serial No. 644,981. (No model.)

To all whom it may concern:

Be it known that I, NESTOR ALBIN WAHTOLA, a citizen of the United States, and a resident of Ironwood, in the county of Gogebic and State of Michigan, have invented certain new and useful Improvements in Diaphragm-Pumps; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to diaphragm-pumps of that class or description which comprise in their structure a stationary pump-tube, a series of stationary partitions provided with ports, passages, and valves, a series of vertically-movable cups and diaphragms connected with said cups and partitions, the construction being such that as the cups are reciprocated water will be forced upward upon both the upstroke and downstroke of the same.

The invention consists in the novel construction and combination of parts, as hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a central longitudinal section of a pump constructed in accordance with my invention on the lines *xx*, Figs. 2, 3, 4, 6, 8, and 10. Fig. 2 is a perspective view looking from the upper side of the lower section of the partition of the lower cups. Fig. 3 is a similar view looking from the under side of the central section. Fig. 4 is a similar view looking from the upper side thereof. Fig. 5 is a similar view looking from the under side of the upper section, also showing the double pump tube or barrel and the lower section of the partition of the intermediate cups. Figs. 6 and 7 are perspective views of the central and upper sections thereof. Figs. 8 and 9 are perspective views of the sections comprising the partition of the upper cups. Fig. 10 is a plan view of the lower section. Fig. 11 is a view looking from the under side of the upper section.

In the said drawings the reference-numeral 1 designates the upper pump tube or barrel, and 2 the lower tube or barrel. The lower and upper ends, respectively, are secured to

stationary circular partitions hereinafter described.

At the upper end of the upper tube 1 is an air-chamber 3, provided with a spout 4 and a turning plug or cock 5. The numeral 6 designates a bracket secured to said tube, with which is pivotally connected a yoke 7, provided with a handle 8, and pivotally connected with said yoke is a rod 9, the lower end of which is pivoted to a lug 10 of a vertically-movable cup or section 12. This section, which is semispherical in shape, is provided with a central opening through which said tube 1 passes and is connected with a similar but inverted cup 13 by means of bolts 15, which pass through flanges 16 on said cups.

Connected with the cup 13, by means of rods 17, is a cup 18, connected by means of bolts 19 with a cup 20. These cups 18 and 20 are identical with cups 12 and 13, and cup 20 is connected by rods 21 with a cup 23, connected by bolts 24 with a cup 25, also similar to cups 12 and 13. The lower tube 2 passes through cup 25, while a double or two-part tube, hereinafter described, passes through cups 13 and 18, while a similar tube passes through cups 20 and 23. The cups where said pipes pass through are provided with stuffing-boxes 26 to make tight joints.

Secured to the lower tube 2 and located within the cups 23 and 25 is a stationary partition made in three parts bolted together by bolts 27 and formed with water ports, passages, and valves hereinafter described. Similar partitions, but slightly different in construction, are located on the cups 18 and 20 and 12 and 13, and confined between the flanges of said cups and upper and central sections of the partitions are diaphragms 28, of leather or other flexible material.

Referring now to the partitions in the lower cups 23 and 25, the numeral 29 designates the lower section of the partition, secured to the upper end of the tube 2, formed in its upper side with an angular passage 30, with which said pipe centrally communicates. Formed in the under side of the central section 31 is a corresponding passage 32, with which communicates through port 33 one section of a pipe 34, divided by a vertical partition 34^a into two semicylindrical sections 35 and 36.

At the ends of said passage 32 are ports 37 and 38, port 37 communicating with the upper cup 23 through a port 39 in the upper section, provided with a valve 40, while port 38 communicates with one end of a curved passage 41 on the upper side of the central section. Port 38 is provided with a valve 42, while the other end of the passage 41 is provided with a port 43, communicating with the lower cup 25 by means of a port 45 in the lower section 29. The upper face of the central section is formed with a curved passage 47, having ports 48 and 49 at each end, closed by means of valves 50 and 51. Port 48 communicates with a curved passage 52 on the under side of the central section, having a port 53 at the opposite end communicating through port 54 in the upper section with cup 23. A passage 56 in the upper side of the lower section registers with passage 52. Port 49 communicates through port 57 in the lower section with cup 25. Passage 47 also communicates with the section or pipe 36 of the double pipe 34. The pipe 34 is connected at the upper end with a partition identical in all respects with the partition just described, except that part or section 36 communicates with passage 47 through port 58 in the central section of said partition, while pipe-section 35 communicates with passages 32 and 30. The partition on the upper series of pipes is identical with the partition in the series below, except that the passage 32 has no port 33.

The operation is as follows: Upon the downstroke of the cups water will be drawn into cup 25 through pipe 2 into passages 30 and 32, port 38, (valve 42 opening,) passages 41, and ports 43 and 45. At the same time water will be forced from cup 23 through ports 54 and 53, passage 52, port 48, (valve 50 opening,) passage 47 to section 36 of pipe 34, and from thence to the cups and partitions above, where a like operation will take place, and from the upper cups the water will be forced to the air-chamber and out through the spout. Upon the upstroke of the cups water from the lower cups 25, 20, and 13 will be forced through ports 57 and 49 (valves 51 opening and valves 50 closing) to the passages 47, and from thence through pipe-sections 36 and pipe 1 to the air-chamber. At the same time water will be drawn into the upper cups through passages 30 and 32 and ports 37 and 39, the valve 40 opening. Upon the downstroke water will be drawn into the pipe-sections 35 and from thence through the passages and ports into the lower cups 13, 20, and 25, as before described.

From the above it will be seen that the pipe-sections 35 are for the purpose of feeding water to the different cups, while pipe-sections 36 are the ones by which the water is forced to the pump-tube 1 and air-chamber. These pipe-sections 35 and 36 are separate and independent in their action and may con-

sist of two pipes instead of a single pipe divided by the partition.

The present invention is designed as an improvement upon that set forth in an application filed on August 26, 1896, Serial No. 604,022, in which is shown and claimed an upper and a lower stationary pump-tube, a partition comprising upper and lower sections secured, respectively, to said pump-tubes, and an intermediate section connected therewith, and said sections provided with ports, passages, and valves, vertically-movable semicylindrical cups through which said tubes pass, and a diaphragm and means for reciprocating said cups on the tubes, all operating substantially as shown in the application.

Having thus fully described my invention, what I claim is—

1. In a diaphragm-pump of the character described, the combination with the upper and lower pump-tubes, the vertically-reciprocating upper and lower cups each consisting of two semispherical sections, the three-part stationary partitions located in said cups, and provided with ports, passages and valves, and the diaphragms, of the intermediate cups, the stationary three-part partition located therein, provided with corresponding ports, passages, valves and diaphragm, the pipe-sections connecting the intermediate cups with the upper and lower ones, the rods connecting said cups and means for vertically reciprocating the cups, and said pipe-sections being divided by a vertical partition into two compartments, one of which forms a common suction-pipe for the lower cups of the cup-sections, and the other, a common discharge-pipe for the upper cups of said cup-sections substantially as specified.

2. In a diaphragm-pump of the character described, the combination of the following elements: the lower pump-tube, the lower cups, the three-part partition, the diaphragm, the lower section of said diaphragm being formed with two ports, the central section formed on its under side with an angular passage with which said tube communicates, and provided with a port at each end, one of which is provided with a valve and communicating with a passage on the upper face of said section, having a port at its opposite end communicating with ports in the central and lower sections and said central section formed on the under side with a passage having a port at each end, one of which communicates with a passage in the upper side of said section and the other with aligned ports in said central and upper sections, and said passages formed at the opposite end with a port communicating with a passage in the upper side of said section, the valves in said passage, and said passages formed with a port communicating with a port in the lower section, and the vertical pipes and intermediate and upper cups provided with partitions and diaphragms and means for connecting and reciprocating said

cups, and the vertical partitions dividing said pipes into two compartments, one of which serves as a common suction-pipe for the lower cups of the cup-sections and the other a common discharge-pipe for the upper cups substantially as specified.

3. In a diaphragm-pump of the character described, the combination with the upper pump-tube 1, the lower tube 2, the vertically-reciprocating lower cups 23 and 25, the sectional partition, the diaphragm, and the lower section of said diaphragm formed with ports 45 and 57 and passages 30 and 56 the central sections formed with ports 33, 37, 38, 43, 48, 49, and 53, passages 32, 41, 47, and 52, and valves 42, 50 and 51, the upper section formed with ports 39, and 54 and provided with valve 40, the cups 18 and 20, connected with cups 23 and 25, the pipe-sections 35 and 36, the diaphragm, the partition similar to said first-named partition provided with a port 58, the upper cups connected with cups 18 and 20,

the diaphragm, the pipe-sections 35 and 36, one of which serves as a common suction-pipe for the lower cups of the cup-sections and the other as a common discharge-pipe for the upper cup-sections, the sectional partition located in the cups 12 and 13 comprising the lower section formed with ports 45 and 57, and passages 30 and 56, the central section formed with ports 33, 37, 38, 43, 48, 49 and 53, passages 32, 41, 47, and 52, and valves 42, 50, and 51, and the upper section provided with ports 39, and 54, and valve 40, and means for reciprocating said cups, substantially as specified.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

NESTOR ALBIN WAHTOLA.

Witnesses:

BELMONT WAPLES,
CURTIS BUCK.