

(No Model.)

C. J. UNDERWOOD.
MERCURY AIR COMPRESSOR.

No. 558,125.

Patented Apr. 14, 1896.

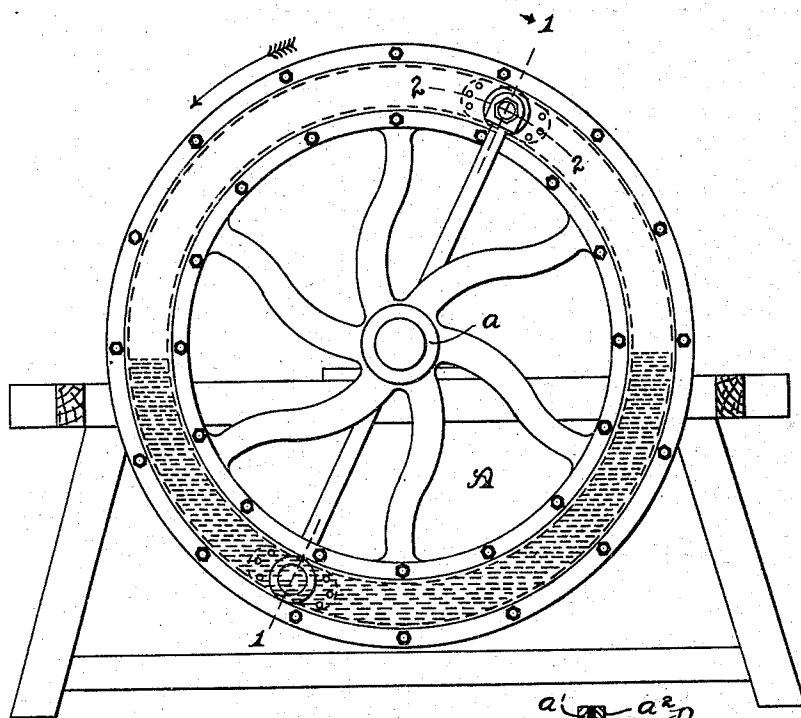


FIG. 1.

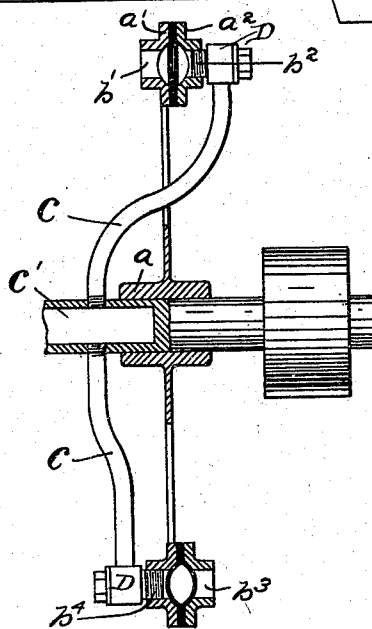
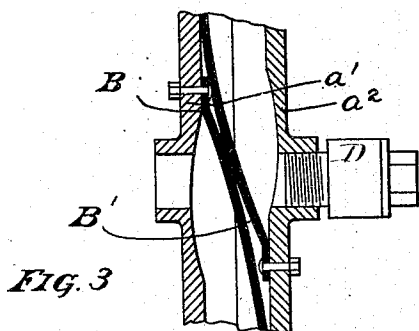


FIG. 2.

Witnesses
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CHESTER J. UNDERWOOD, OF ELGIN, ILLINOIS, ASSIGNOR OF ONE-FOURTH
TO EDWARD HASKINS, OF ST. CHARLES, ILLINOIS.

MERCURY AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 558,125, dated April 14, 1896.

Application filed July 8, 1895. Serial No. 555,354. (No model.)

To all whom it may concern:

Be it known that I, CHESTER J. UNDERWOOD, of Elgin, Kane county, Illinois, have invented certain new and useful Improvements in Mercury Air-Compressors, of which the following is a full and complete specification.

The object of my invention is to provide an efficient and economical machine for compressing air, and the features and improvements I have designed to attain this object are fully shown in the accompanying drawings.

Figure 1 is a side elevation of my invention; Fig. 2, a sectional elevation on line 1 1 of Fig. 1; and Fig. 3 a partial section, on an enlarged scale, on line 2 2 of Fig. 1.

I provide a wheel A, having a suitable hub *a*, shaft, bearings, and driving-pulley, and a tubular rim, preferably made by bolting two U-shaped sections *a'* and *a''* together, as shown in section in Fig. 2, suitable packing being provided to make the joint perfectly tight, and one of said U-sections forming an integral part of the arms of said wheel. Within this hollow rim are two diaphragms B and B', made of flexible material, each occupying slightly over one-half the circumference of the channel, so that the ends of each extend by the other slightly, and each of which, in conjunction with one of the walls of the channel to which it is tightly fastened, forms an air pocket or chamber. Near each end of such pockets are provided openings in the rim, that at one end of each pocket acting as an air-inlet *b'* and *b''*, and at the other end as an outlet for the expulsion of air *b³* and *b⁴*, and in the passages leading from the latter openings are provided suitable check-valves D. Each corresponding inlet and outlet are situated at points on the rim diametrically opposite to each other, while each inlet of one pocket is situated at a point horizontally opposite the outlet of the other pocket, as shown in Fig. 3. The compartment of the hollow rim outside of and separate from the air-pockets is about half filled with mercury, which naturally takes the lowest position, as indicated by the broken lines in Fig. 1, and as the wheel is revolved each pocket in turn passes the mercury, which presses the dia-

phragm to the wall and expels whatever air was within the pocket through the check-valves and hollow shaft to a suitable receptacle.

It will be evident that as the wheel revolves in the direction shown by the arrow that end of each pocket which has the air-inlet comes first to the mercury, which presses the diaphragm to the wall, closing the inlet against the admission or escape of air, and whatever air is in the pocket ahead of it is expelled through the outlet until the air has all been expelled. As that end of the pocket which has the air-inlet first emerges from the mercury the air again enters the inlet and inflates the pocket, for if the diaphragm remained close to the wall after it had passed the mercury a vacuum would be produced in the chamber thus formed, so the air rushes in to prevent the formation of a vacuum and pushes the diaphragm over to the opposite wall, again filling this chamber. As the wheel revolves rapidly, these operations take place in quick succession, and by connecting the hollow shaft with a suitable reservoir air can be forced within it to a high degree of compression.

Thus it will be seen that my invention discloses an extremely simple and efficient apparatus with but few working parts to get out of order, and which requires but little power to operate it.

While I have described my invention with more or less completeness as regards the details thereof and as being embodied in more or less precise form, I do not desire to be limited thereto unduly, as I contemplate all proper changes of form, omission of parts, and the substitution of equivalents as circumstances may suggest or necessity render expedient.

I claim—

1. In an air-compressor, the combination of a wheel provided with a hollow rim, ports for the admission of air to and expulsion of air, from such hollow rim, respectively, flexible diaphragms, and a body of mercury within such hollow rim, which during a continuous rotation of such wheel actuates such diaphragms to effect the opening and closing of such ports, substantially as described.

2. In an air-compressor, the combination of a wheel provided with a hollow rim, a body of mercury within such hollow rim, and compartments adapted to be filled with air and
5 separate from the compartment occupied by said mercury, substantially as described.

3. In an air-compressor, the combination of a wheel provided with a hollow rim, a body of mercury within such hollow rim, compartments
10 separate from that occupied by the mercury and adapted to be filled with air, and so constructed that the passage of said compartments through said mercury acts to expel the air from such compartments, substan-
15 tially as described.

4. In an air-compressor, the combination of a wheel provided with a hollow rim, a body of mercury within such hollow rim flexible diaphragms within said rim and forming compartments
20 separate from that occupied by said mercury, said compartments provided with openings for the admission and expulsion of air, substantially as described.

5. In an air-compressor, the combination of
25 a wheel provided with a hollow rim, a body of mercury within such hollow rim, flexible diaphragms within such rim forming compartments separate from that occupied by the mercury, each compartment provided near

one end with a port for the admission of air, 30 and near the other end with an outlet or port for the expulsion of air, said ports adapted to be closed successively by the pressure of said mercury against said diaphragms as each diaphragm is brought into contact with the mer- 35 cury by the revolution of the wheel, substantially as described.

6. In an air-compressor, the combination of a wheel provided with a hollow rim, a body of mercury within such hollow rim, flexible diaphragms within such rim adapted to form
40 compartments separate from that occupied by the mercury, each compartment provided near one end with a port for the admission of air, and near the other end with an outlet or 45 port for the expulsion of air, said ports adapted to be closed successively by the pressure of said mercury against said diaphragms as each diaphragm is brought into contact with the mercury by the revolution of the wheel, 50 and said outlets provided with check-valves and with suitable connections to a hollow shaft adapted to support and to operate the wheel, substantially as described.

CHESTER J. UNDERWOOD.

Witnesses:

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