No. 618,242. Patented Jan. 24, 1899.

A. A. E. STERZING.

HYDRAULIC AIR COMPRESSOR.

(Application filed Nov. 22, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

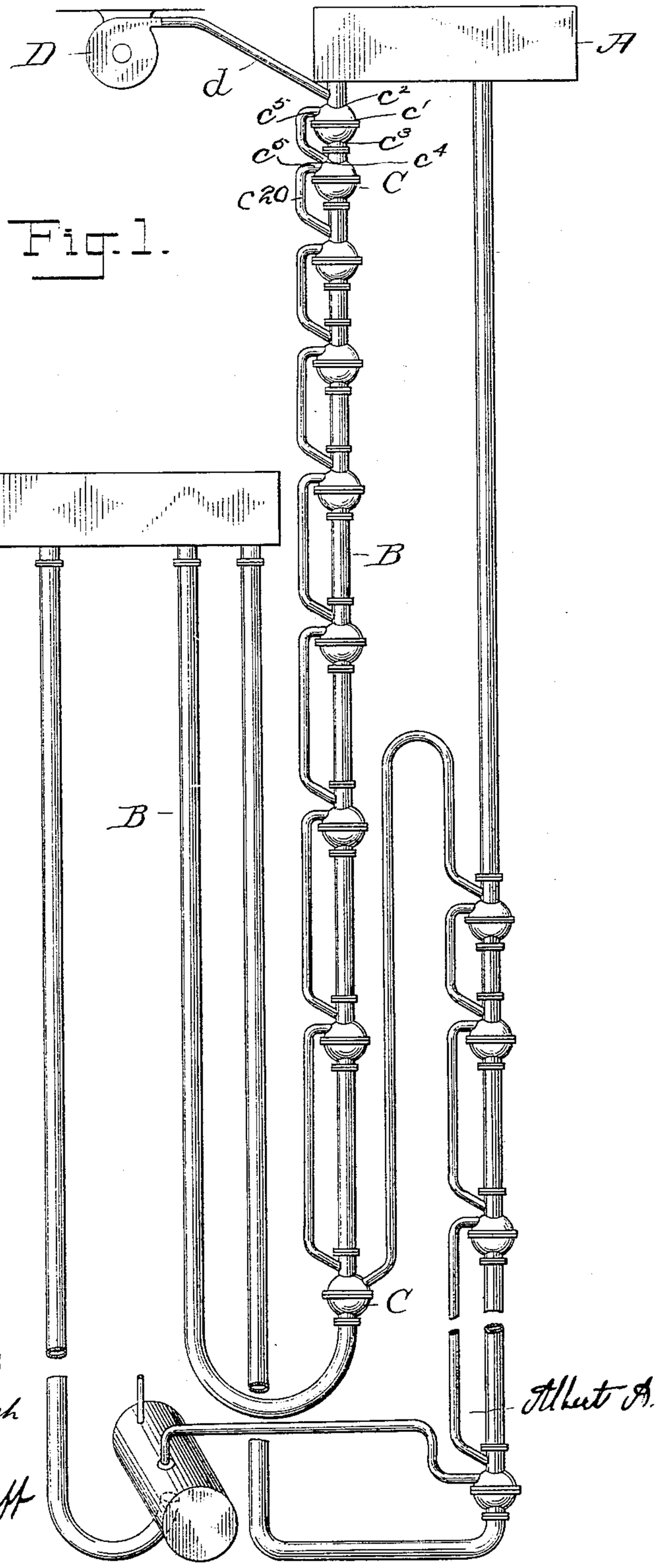

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Fig. 6.

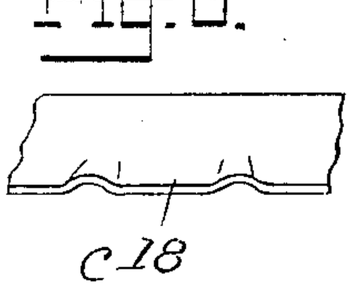


Fig. 5.

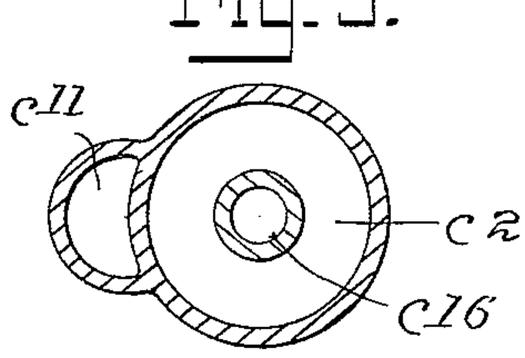


Fig. 2.

Fig. 3.

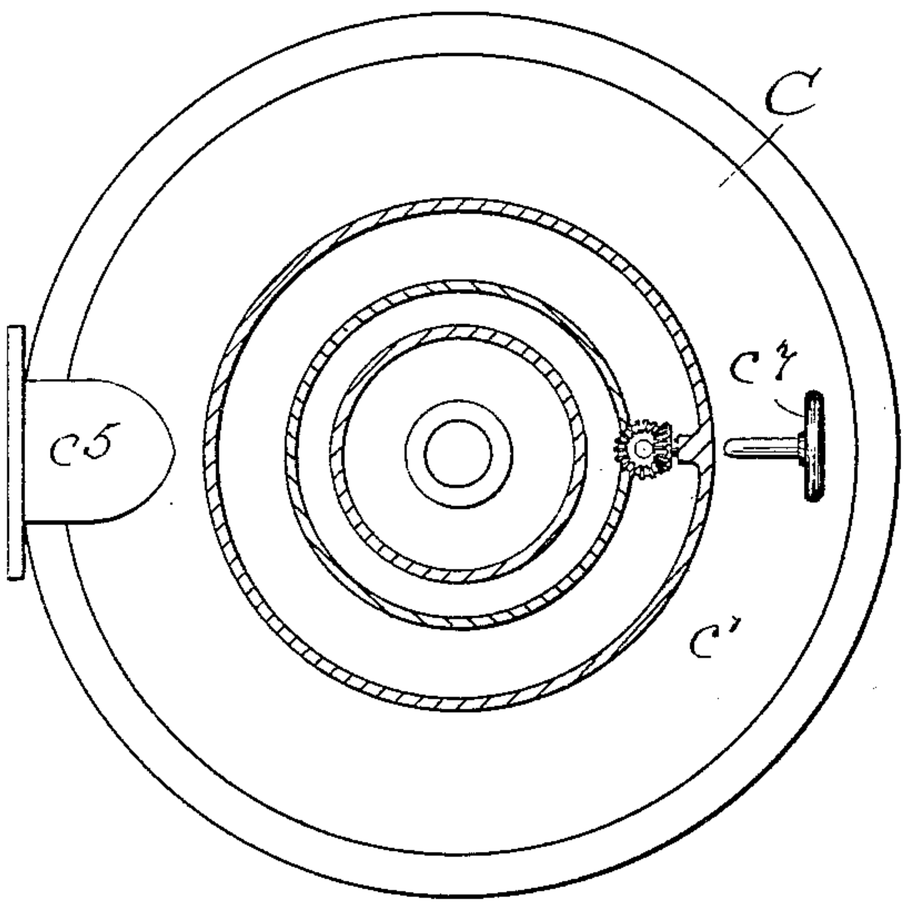
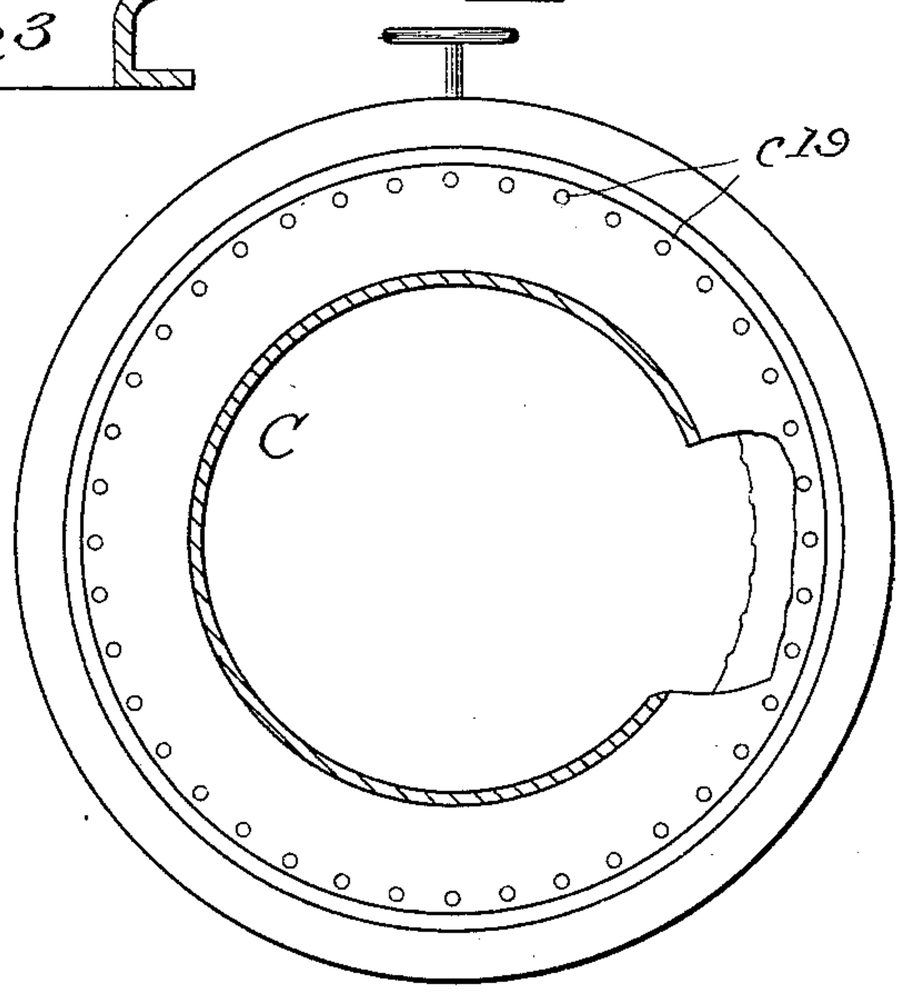


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALBERT AUGUST ERNEST STERZING, OF NEW YORK, N. Y.

HYDRAULIC AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 618,242, dated January 24, 1899.

Application filed November 22, 1897. Serial No. 659,529. (No model.)

To all whom it may concern:

Be it known that I, ALBERT AUGUST ERNEST STERZING, a subject of the Queen of Great Britain, residing at New York, in the county and State of New York, have invented an Improvement in Hydraulic Air-Compressors, of which the following is a specification.

My invention relates to an apparatus by which the hydrodynamic force of fluid bodies or columns is used to compress air or gases to various degrees of density.

The aim of the invention is to utilize the pent-up force or pressure of water or other liquids of greater density in one or more U-shaped pipes.

My invention relates to a hydraulic air-compressor.

The novelty of my invention lies in the peculiar construction and arrangement of the injectors, as hereinafter described and claimed.

In the accompanying drawings, forming part of this specification, like letters of reference indicate corresponding parts throughout the several views, in which—

Figure 1 is a view in elevation representing one embodiment of the invention applied. Fig. 2 is a central vertical section of one of the injectors. Fig. 3 is a horizonal sectional view thereof, taken on the line 3 3 of Fig. 2. Fig. 4 is a similar view taken on the line 4 4 of the same figure. Fig. 5 is a detail section taken on the line 5 5 of Fig. 1, and Fig. 6 is a detail view of the flanged portion of the injector.

In the drawings, A represents a suitable source of supply or head of water.

B is a U-shaped pipe having one of its legs extended and connected with the tank A.

C indicates a series of injectors, which are interposed in the longer leg of the pipe B.

A blower D is substituted to serve for the first injector, and if the pressure at the blower be sufficiently increased the second injector may also be omitted. Air from the blower enters the uppermost injector of the series by way of a pipe *d*.

Each injector comprises a spherical casing c', formed in two parts and provided with a water inlet c^2 and an outlet c^3, also with an air inlet and outlet c^4 and c^5. The water-inlet pipe terminates in an adjustable flared mouthpiece c^6, controlled by a hand-wheel c^7, operating gearing by which the flared portion may be raised or lowered. Formed in part with the upper portion of the casing is a flared wall c^8, which surrounds the mouthpiece above mentioned and forms an annular inlet-port adjacent thereto for air and serves also to divide a compressed-air chamber c^9 from an air-inlet chamber c^{10}, which latter communicates directly with the inlet proper by way of a passage c^{11}. Within the mouth of the water-inlet pipe a hollow bell-shaped cap c^{12} is mounted and communicates with the air-inlet by way of a pipe or passage formed in part with the casing. This bell or cap is adjustably controlled by a hand-wheel c^{13} through suitable gearing c^{14} to regulate a second air-inlet port c^{15}, formed at the mouth of the bell by a horizontally-disposed disk c^{16}, adjustably mounted in a spider of the lower portion of the casing. This disk is provided with an outwardly-flared circumferential flange c^{17}, coacting with a deflector c^{18}, against which latter the water and air are forced in a violent state of agitation, and thereby directed inwardly against the flange of the disk, causing a separation of the air by the escape of the water at the bottom.

In operation the water in its downward course would practically fill the main or U-shaped pipe and the smaller connections; but if air is forced into the upper small pipe by atmospheric or greater pressure, as by the blower illustrated, it would be directed against the thin moving stream or sheet of water issuing from the sprayer and would tend to clear this pipe of all water. With the pipe free the air entering and coming into contact with the water would be carried along with it for a short distance and subjected to the pressure of the water in the first injector. This air and water will not immediately enter the body of water contained in the lower portion of the chamber, as it is somewhat confined by the inward projecting annular flange of the deflector, which, however, permits the water to escape from its under side, but retains the air until the space or chamber formed by the flange is filled with a mixture of air and water in a high state of commotion. Then the air or foam is forced to seek a way of escape through the solid body of water in the form of large bubbles, which action is facilitated by indenting or turning

up the edge of the flange at points, as indicated in Fig. 6. The air and water in escaping from the flange are directed by the central disk toward the wall of the chamber, and the air by its buoyancy passes through openings c^{19} into the chamber. From this chamber the air passes into a pipe c^{20}, connecting with the next injector, where it enters, and in being similarly acted upon, as described, is further compressed and attains the pressure of the water in the second injector. This action continues until all the air pipes and chambers are filled with air, which finally attains the pressure of the water in the last injector.

Referring to Fig. 1, it will be observed that a connection is provided between the compressed-air-storage tank and the tank receiving the overflow from the apparatus. The purpose being to maintain a maximum pressure of the air within the tank—that is to say, as the air in a compressed state enters therein it will tend to displace a certain portion of the contained liquid against the weight or back pressure of the column within the connecting pipe above referred to. When this stored air is drawn upon for service, the weight or back pressure of the water forces a sufficient quantity of the liquid into the tank to compensate for the air drawn off, and thereby reëstablishes an equilibrium of pressure.

It will be understood that I do not wish to limit myself to the exact construction or arrangement illustrated, as various changes may be made without departing from the spirit of my invention.

What I claim as new is—

1. A hydraulic air-compressor, comprising a series of operatively-connected injectors each provided with requisite inlets and outlets for water and air, said inlets being telescopically arranged and terminating in concentrically-disposed annular ports, a deflector adjacent to the ports and a chamber receiving the discharge from the ports and having independent outlets for air and water, as specified.

2. The combination with a hydraulic air-compressor, of an injector provided with requisite inlets and outlets for water and air, said inlets being telescopically arranged and terminating in flared annular ports concentrically disposed, means for adjusting the inlets to vary the area of the ports, a deflector, and a chamber receiving the discharge from the ports and having independent outlets for air and water, as specified.

In witness whereof I have hereunto set my hand this 23d day of October, 1897.

ALBERT AUGUST ERNEST STERZING.

Witnesses:
W. H. PUMPHREY,
ERNEST V. PLATT.