No. 730,589. PATENTED JUNE 9, 1903.

C. W. WEISS.

CENTRIFUGAL PUMP AND COMPRESSOR.

APPLICATION FILED AUG. 3, 1901.

NO MODEL.

Fig. 1.

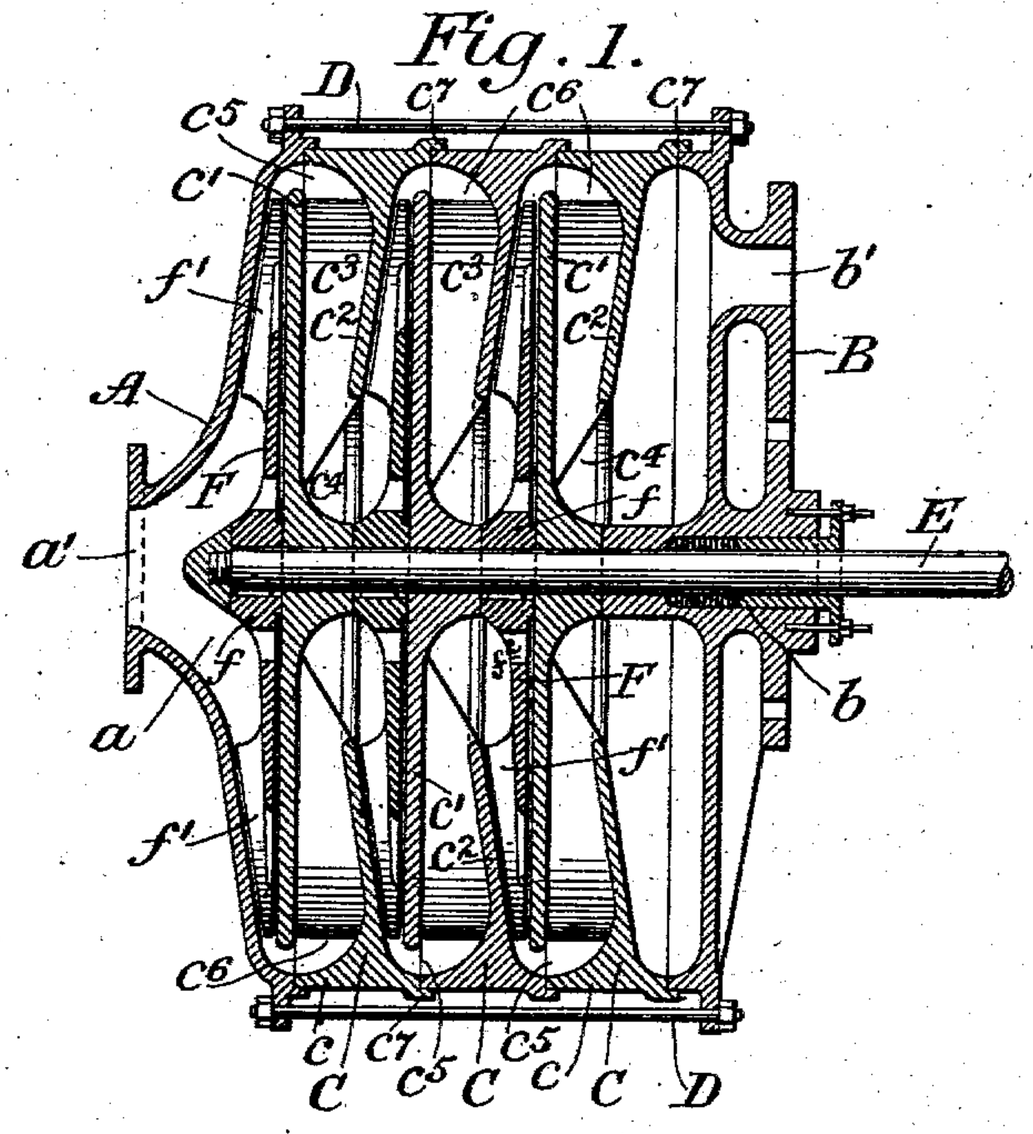


Fig. 2.

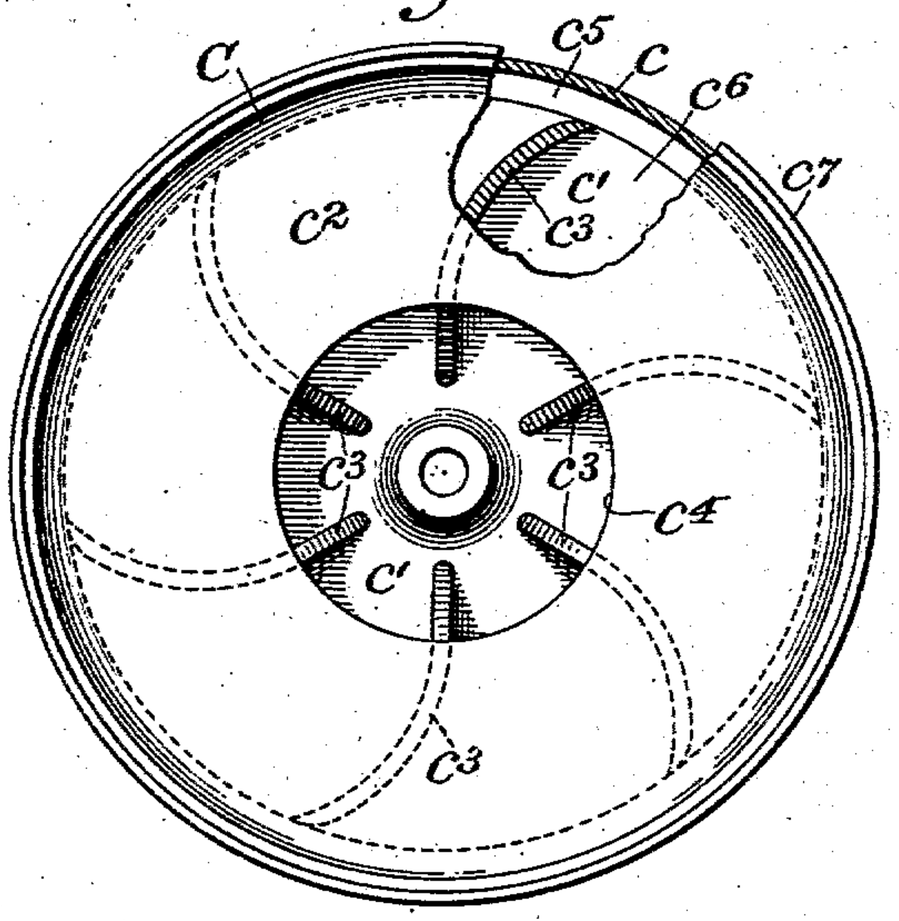
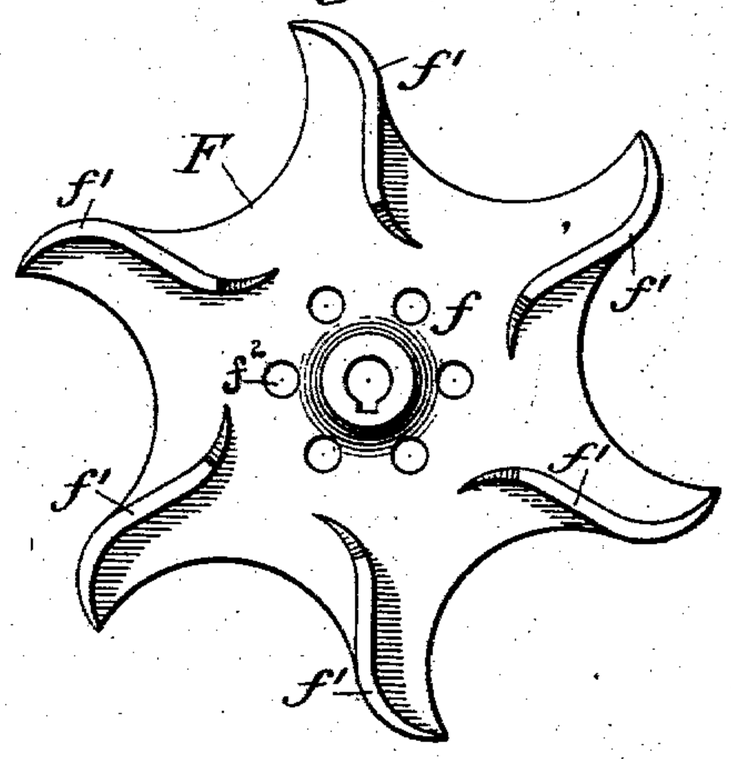


Fig. 3.



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UNITED STATES PATENT OFFICE.

CARL W. WEISS, OF NEW YORK, N. Y.

CENTRIFUGAL PUMP AND COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 730,589, dated June 9, 1903.

Application filed August 3, 1901. Serial No. 70,713. (No model.)

To all whom it may concern:

Be it known that I, CARL W. WEISS, a citizen of the United States, whose residence and post-office address is borough of Manhattan, in the city of New York, State of New York, have invented certain new and useful Improvements in Centrifugal Pumps and Compressors, of which the following is a specification, reference being had to the accompanying drawings.

In the use of centrifugal pumps and compressors it is usual when an increase of pressure above the capacity of a single pump is desired to connect two or more single pumps in tandem. This naturally involves a multiplication of expense, considerable floor space, and more or less waste of power in the driving-gear, &c.

It is the object of this invention to provide for the compounding of two or more centrifugal pumps or compressors in a single structure, so that the disadvantages above mentioned shall be overcome and so that it shall be possible for the manufacturer to keep sections in stock and to supply on short notice a pump or compressor of any desired power.

A further object is to improve the construction of each single pump or section so as to increase its efficiency and to reduce the cost of manufacture.

The invention will be more fully described hereinafter with reference to the accompanying drawings, in which for the purpose of illustration and explanation of the nature of the invention is illustrated one convenient and practical embodiment of the invention.

In the drawings, Figure 1 is a view in longitudinal section of a triple compounded pump which embodies the invention. Fig. 2 is a face view of one of the chamber-sections as seen from the right in Fig. 1, a portion of the chamber-wall being broken out. Fig. 3 is a face view of one of the impellers as seen from the left of Fig. 1.

As shown in the drawings, the shell or casing of the improved pump or compressor is made up of a suction-head A and a discharge-head B with one or more intermediate chamber-sections C, the several parts being formed to fit tightly together and being held together by bolts D, which engage flanges of the suction-head and discharge-head. It will be obvious that as many chamber-sections as may be desired can be securely held together by some such means as those just described between a suction-head and a discharge-head, it being necessary simply to provide bolts of suitable length. Each chamber-section in the construction represented in the drawings comprises an outer wall c, which forms the outer shell of the pump, a partition-plate c', which may have a central bearing for the driving-shaft E, a chamber-wall c^2, and preferably a series of webs c^3, each of such webs being preferably curved, substantially as shown in Fig. 2, so as to direct inwardly toward the central opening c^4 the water or air or other liquid or fluid which is delivered through the annular discharge-opening c^5 about the periphery of the partition-plate c'. The chamber-wall c^2 is curved gently outward from the partition-plate to form a pressure-chamber of enlarged section which shall create a minimum of friction and cause no whirls in the fluid, the chamber-wall being then inclined inwardly toward the approximately central opening c^4, through which the fluid or liquid issues from the pressure-chamber c^5, which is formed between the partition-plate and the chamber-wall. Preferably, although not necessarily, the partition-plate is cast in one piece with the chamber-wall and the webs c^3, being supported by the webs so as to leave its entire periphery free and separated by a narrow annular space from the wall c, through which the fluid is delivered to the pressure-chamber with the high velocity developed by the impeller. The suction-head A forms, with the first partition-plate or chamber-section, a suction-chamber a, which is tapered from the central portion between the periphery of the partition-plate, so that the fluid or liquid which is driven outward from the center by the impeller acquires an increased velocity as it passes by the partition-plate into the pressure-chamber c^6, in which an increased pressure is established by reason of such velocity. The outer wall c and inwardly-inclined wall c^2 of each section in like manner form a suction-head for the next section, and in each suction-chamber is disposed the impeller F, which is secured to the driving-shaft E and may have any suitable form. As rep-

resented in the drawings, the impeller comprises a central hub or body portion f with radiating curved arms or webs f', which have a snug working fit within the suction-chamber, whereby the fluid or liquid delivered to the suction-chamber through the central opening a' is driven outward toward the periphery of the partition-plate, over which it passes into the pressure-chamber, as hereinbefore described. The impeller is preferably cut away between the webs f', and may also be provided with openings f^2 to permit the water to pass to the rear side of the impeller and to establish behind the same a pressure equal to that on its face, so that it shall be balanced and not subjected to a thrust in one direction. It also preferably conforms and lies in close proximity to the partition-plate to avoid the formation behind it of a chamber in which whirls might be created.

The discharge-head B may be formed in any convenient manner, either as a part of the last section or independently thereof. As shown in the drawings, it is formed independently of the last chamber-section, so that each chamber-section exactly resembles every other. The discharge-head may be provided with a hub or bearing b for the driving-shaft E, and it may also be provided with a suitable discharge-opening b'. Each chamber-section is formed to fit tightly against the next section of the adjacent head, being conveniently provided, as indicated in the drawings, with a lip c^7, which receives the rim of the next adjacent section.

It will be observed that the webs c^3 extend from the chamber-wall to the partition-plate, affording no opportunity for the passage of the fluid between the edge of the web and such wall or partition plate, and, furthermore, that the webs f' of the impeller extend only from the margin of the central opening c^4 toward the periphery of the partition-plate, thus avoiding the setting up of a swirling motion of the fluid before it is acted upon by the impeller, which would be the case if these webs projected into such central opening, the setting up of such swirling motion largely reducing the efficiency of the pump or compressor, if not altogether defeating the purpose of the apparatus.

It will be obvious in view of the foregoing description that each separate pump or pump-section is itself formed in such a manner as to secure the maximum of efficiency with the minimum of cost and that any number of such separate pumps or pump-sections can be compounded readily in a single compact pump of greater power, the several sections being fitted together and held tightly by the bolts which engage the flanges of the suction and discharge heads. In such a compounded pump the pressure-chamber of each section delivers the liquid or fluid directly to the next section at the pressure developed by the leading section, so that the pressure developed by the compounded pump is proportionate to the number of sections.

I claim as my invention—

1. A centrifugal pump-section, comprising an outer wall or shell, a chamber-wall supported by said shell to direct the fluid toward a central discharge-opening, inclined webs supported by said chamber-wall, a partition-plate carried by said webs and having its periphery separated from said shell by a narrow annular space, said webs extending from the chamber-wall to the partition-plate, substantially as described.

2. A centrifugal pump, comprising a suction-head, a discharge-head, a plurality of pump-sections fitted directly together and secured between said heads, each of said pump-sections comprising an outer wall or shell, a chamber-wall supported by said shell to direct the fluid toward a central discharge-opening, inclined webs supported by said chamber-wall, a partition-plate carried by said webs and having its periphery separated from said shell by a narrow annular space, such chamber-wall forming with the partition-plate of the next section a tapering impeller-chamber and said webs extending from the chamber-wall to the partition-plate, a common driving-shaft and a series of impellers, one for each pump-section, secured to said driving-shaft and having webs extending from the margin of the central opening toward the periphery of the partition-plate, substantially as described.

3. In a rotary pump, a series of impeller-chambers, rotary impellers in said chambers provided with radial discharge-passages, return-passages in said chambers adjacent to said impellers, each return-passage connecting by a curved way with the next succeeding impeller, fixed curved vanes in said return-passages, and curved annular passages external to said impellers and return-passages forming communications from each impeller at its periphery to each return-passage, substantially as described.

This specification signed and witnessed this 1st day of August, A. D. 1901.

CARL W. WEISS.

In presence of—

LUCIUS E. VARNEY,

ROSWELL S. NICHOLS.