(No Model.) 3 Sheets—Sheet 1.

C. G. CURTIS.

ELASTIC FLUID TURBINE.

No. 591,822. Patented Oct. 19, 1897.

Fig. 1,

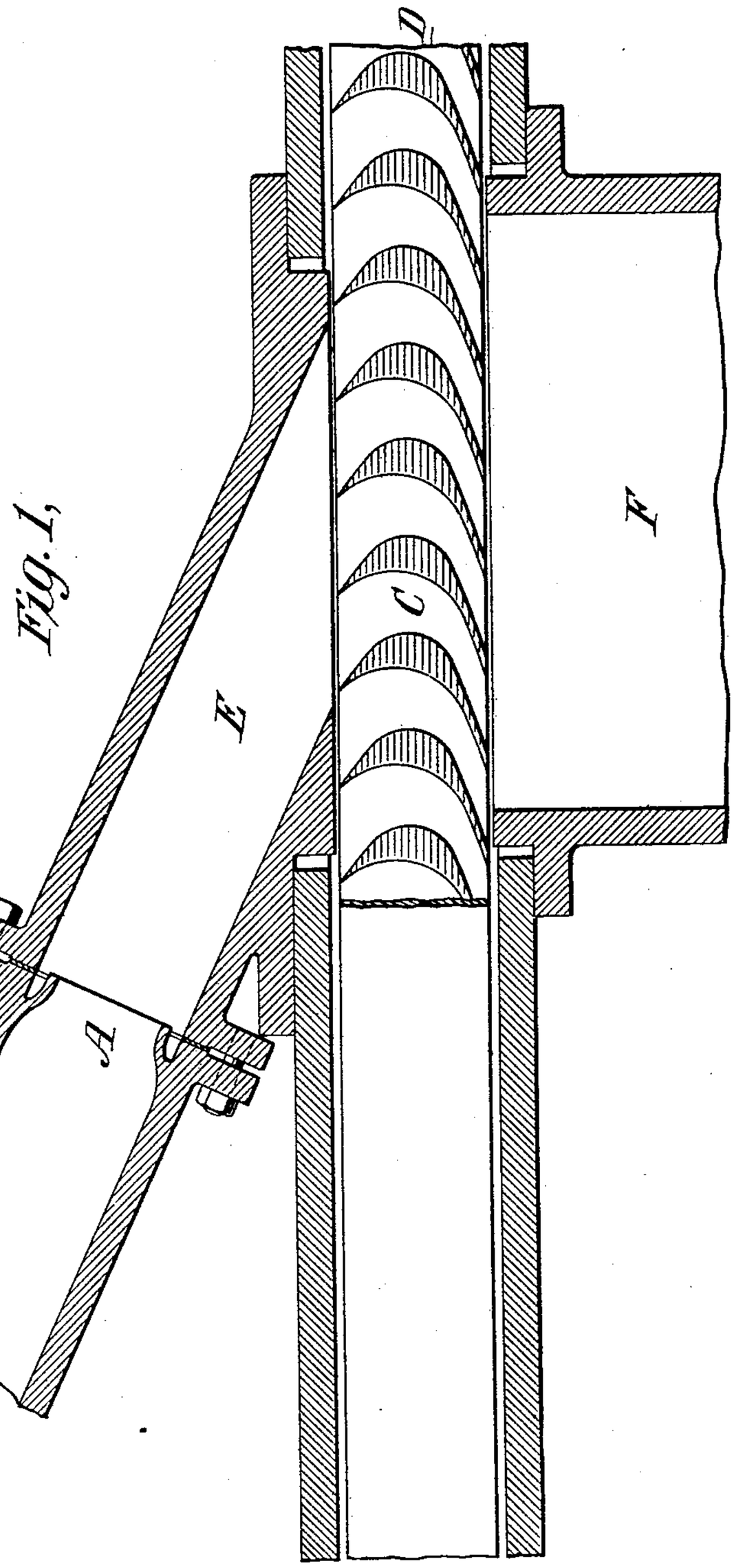

Fig. 2,

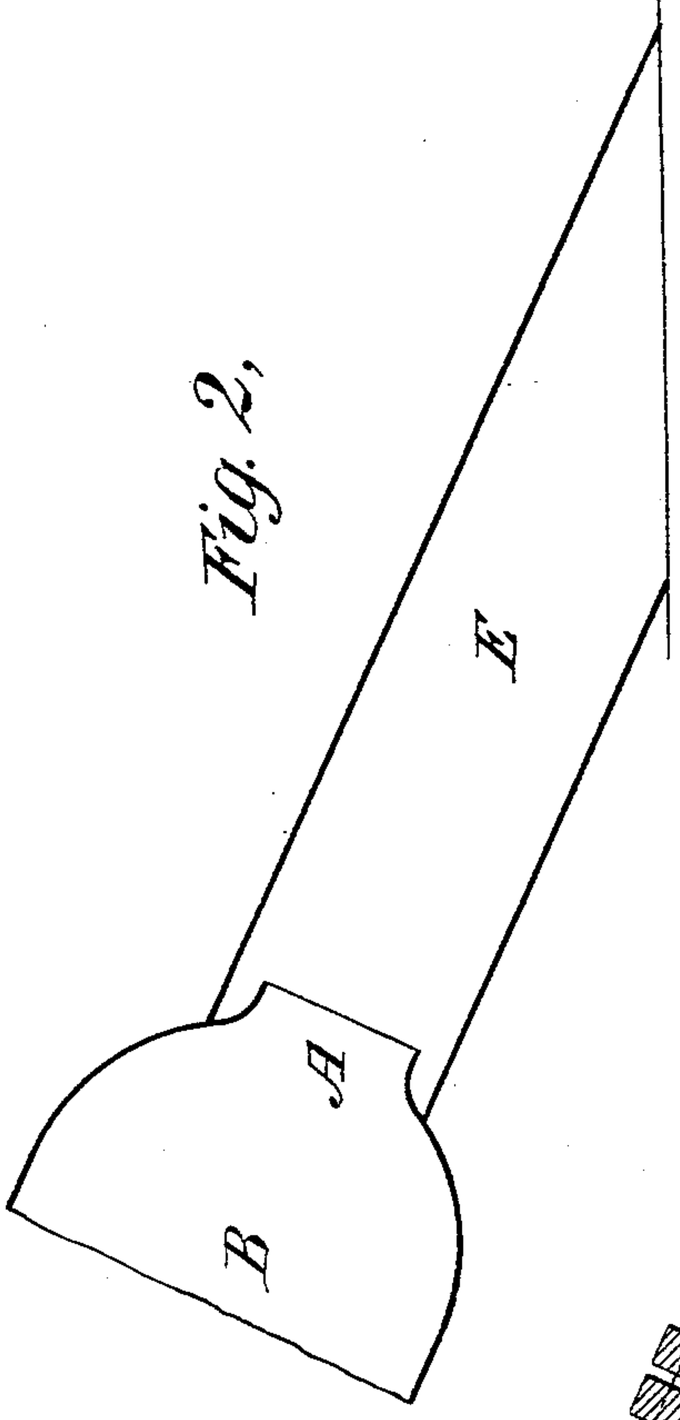

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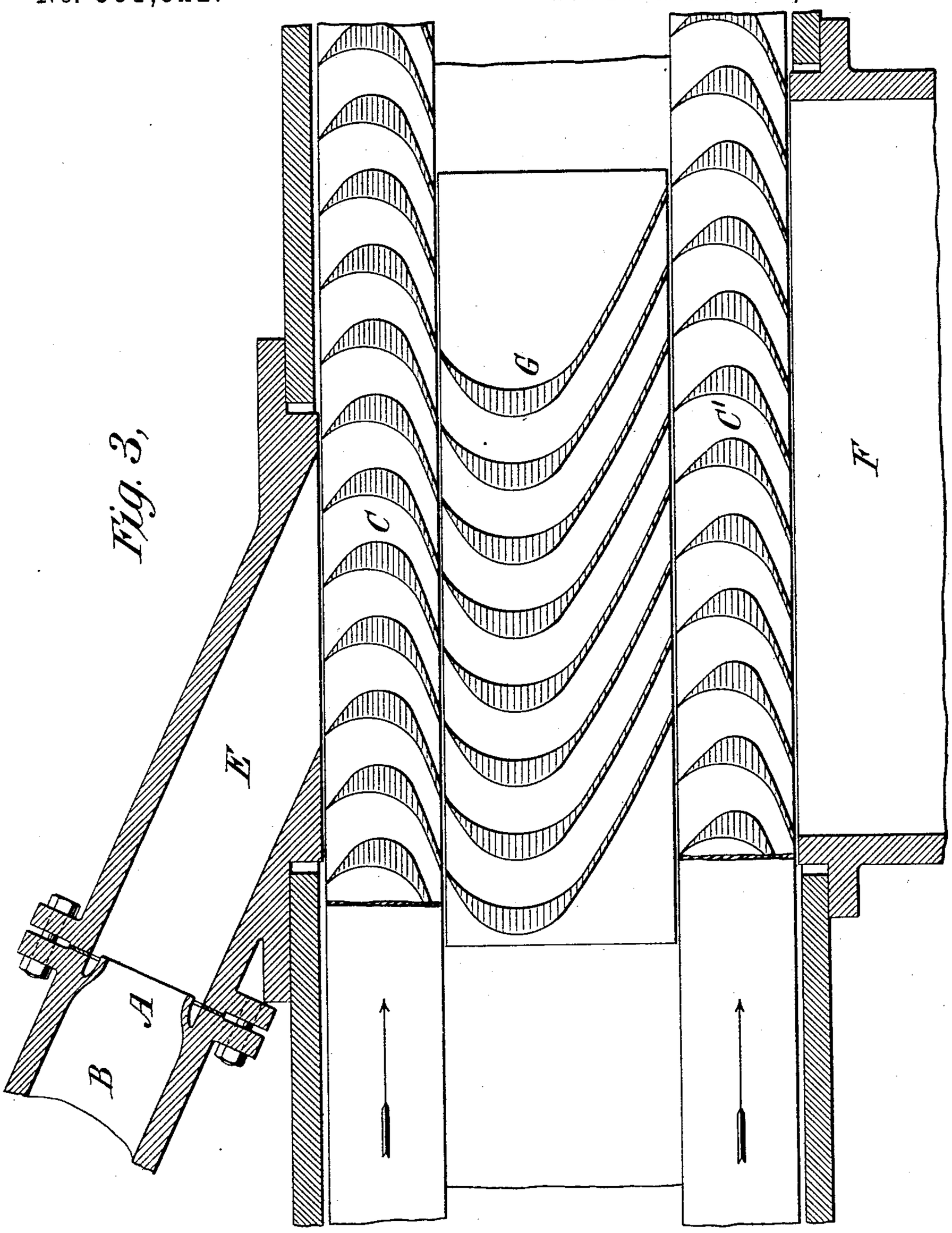
Fig. 3,



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(No Model.) 3 Sheets—Sheet 3.

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ELASTIC FLUID TURBINE.

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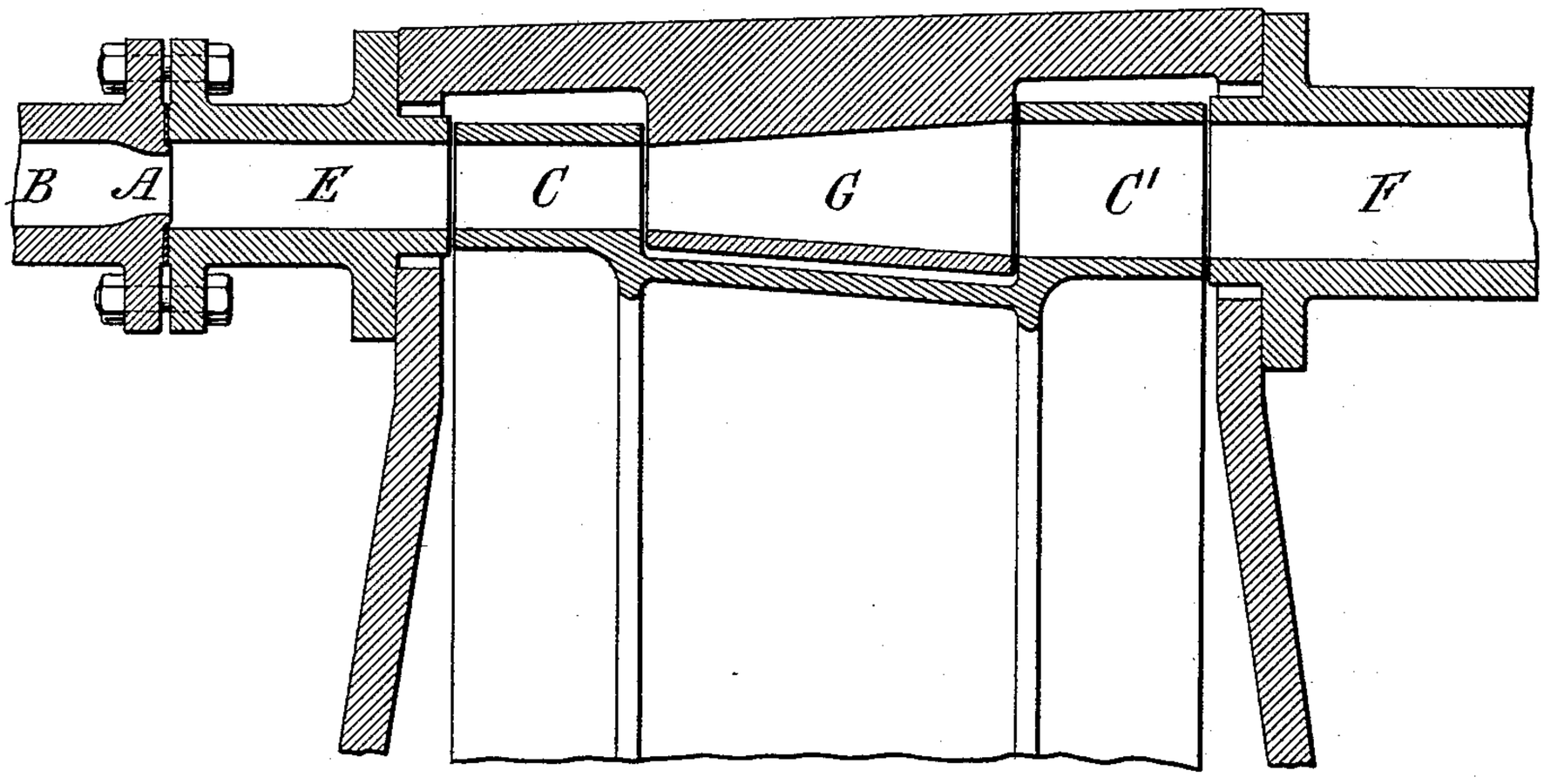
Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES G. CURTIS, OF NEW YORK, N. Y., ASSIGNOR TO THE CURTIS COMPANY, OF SAME PLACE.

ELASTIC-FLUID TURBINE.

SPECIFICATION forming part of Letters Patent No. 591,822, dated October 19, 1897.

Application filed August 4, 1896. Serial No. 601,604. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. CURTIS, a citizen of the United States, residing at New York city, in the county and State of New York, have invented a certain new and useful Improvement in Elastic-Fluid Turbines, of which the following is a specification.

My invention relates to an apparatus for delivering a jet of steam or other elastic fluid to a turbine wheel under conditions designed to secure the maximum efficiency. It has long been well-known that in the case of an elastic fluid, such as steam, a higher velocity of efflux can be obtained from a nozzle or orifice by making such nozzle or orifice with diverging walls or sides so proportioned regarding length and width as to permit a gradual expansion of the fluid and at the same time an increase of velocity of the flowing jet, such diverging walls operating to resist the lateral pressure and to confine the fluid during expansion. In this way the jet assumes a tapering form, the particles traveling in divergent paths, under which conditions the jet has been delivered against buckets or vanes of the turbine wheel.

My invention consists in an improved form of nozzle or jet-delivering device, in which the nozzle itself is set at a certain distance from the wheel, and the jet, instead of being confined during expansion by inclined or diverging walls and delivered against the wheel in the shape of a diverging jet, as heretofore, is allowed to expand freely after leaving the nozzle up to any desired degree of expansion, at which point parallel guiding walls or surfaces are introduced, which operate to prevent further expansion, and at the same time bring all the particles of the jet to a parallel course before the jet reaches the wheel. In this way the jet, not being confined during expansion, is not subjected to friction on the diverging sides of the passage, and a freer expansion is obtained.

In the accompanying drawings, forming a part hereof, Figure 1 is a horizontal sectional view illustrating my improved nozzle and its application to an elastic-fluid turbine. Fig. 2 is a sectional view in outline, illustrating a somewhat modified form of the nozzle. Fig. 3 is a horizontal sectional view illustrating the application of the improved nozzle to one form of turbine, and Fig. 4 is a vertical section on the line of the fluid-passages of the apparatus of Fig. 3.

The nozzle A is formed by contracting the end of the conduit or pipe B leading from the boiler or source of supply of the elastic fluid. The cross-sectional area of the nozzle A is such that the desired quantity of fluid will pass through it. This nozzle, instead of being set to deliver the jet directly to the vanes C of the turbine wheel D, delivers the fluid-jet into an intermediate guiding-passage E, having parallel side walls. The guiding-passage E is larger than the nozzle A. The fluid-jet, as it leaves the nozzle A, expands freely until it strikes the walls of the passage E, when further expansion is prevented, and the movement of the particles is made a parallel one before the jet is delivered to the vanes C.

F is the exhaust-opening of the turbine.

In Figs. 3 and 4 the nozzle is shown applied to a turbine having two sets of movable vanes C C′ and an intermediate set of stationary vanes G.

What I claim as my invention is—

1. In a turbine for utilizing the velocity of steam or other elastic fluid, a jet-delivering nozzle in combination with an expansion and guiding passage having a constant cross-sectional area greater than the nozzle and equal to the issuing jet's cross-section at the desired expansion, located between the nozzle and the vanes of the turbine, whereby the pressure is converted into *vis viva* to any desired extent before delivery to the turbine, substantially as described.

2. In combination with a turbine for utilizing the velocity of steam or other elastic fluid, the conduit B, nozzle A and guiding-passage E, substantially as set forth.

This specification signed and witnessed this 30th day of July, 1896.

CHARLES G. CURTIS.

Witnesses:
EUGENE CONRAN,
JNO. R. TAYLOR.