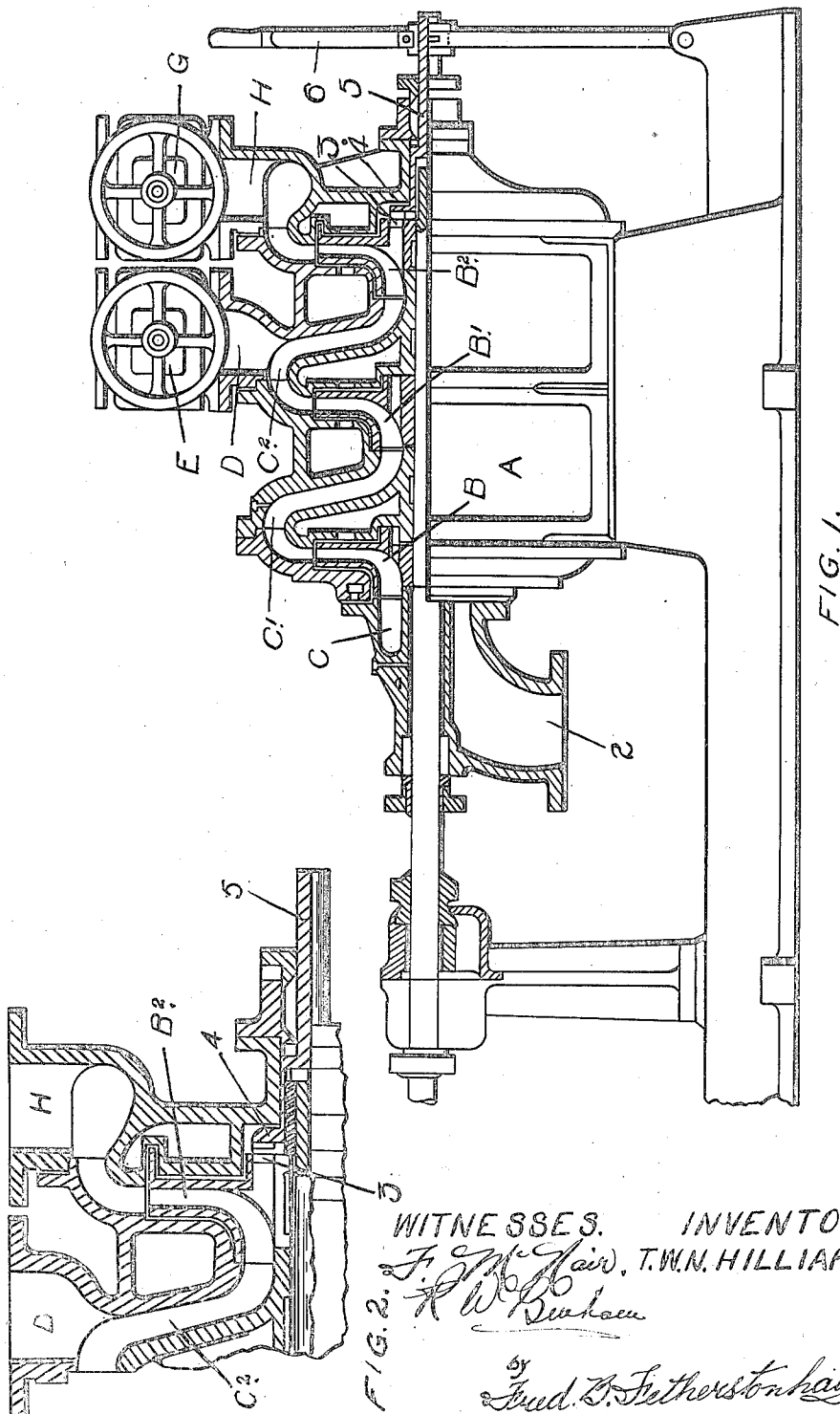


T. W. N. HILLIARD.
CENTRIFUGAL OR TURBINE PUMP.
APPLICATION FILED FEB. 23, 1911.

1,059,994.

Patented Apr. 29, 1913.



WITNESSES. INVENTOR.
J. M. Fair, T. W. N. HILLIARD.

by Fred. B. Featherstonhaugh atty

UNITED STATES PATENT OFFICE.

THOMAS WILLIAM NICHOLLS HILLIARD, OF TORONTO, ONTARIO, CANADA.

CENTRIFUGAL OR TURBINE PUMP.

1,059,994.

Specification of Letters Patent.

Patented Apr. 29, 1913.

Application filed February 23, 1911. Serial No. 610,280.

To all whom it may concern:

Be it known that I, THOMAS WILLIAM NICHOLLS HILLIARD, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, engineer, have invented certain new and useful Improvements in Centrifugal or Turbine Pumps, of which the following is the specification.

My invention relates to that type of pump known as the centrifugal or turbine and particularly a compound or multistage pump in which a plurality of impellers are employed in series, and the objects of the invention are to devise a pump of this class which may be operated to develop different head pressures while running at constant speed and may be operated economically at low pressures.

The invention consists essentially in the novel construction and arrangement of parts, whereby one or more impellers may be disconnected from operating with the constantly operated impeller or impellers or operatively connected therewith to lower or raise the discharge pressure.

Figure 1, is a longitudinal elevational view of a pump partly in section showing the parts involved in my invention. Fig. 2 is an enlarged sectional detail showing one form of clutch mechanism for connecting one of the impellers to or from the shaft.

In the drawings like letters of reference indicate corresponding parts in each figure.

Referring to the drawings, A is the pump casing supported on a suitable base and having the suction chamber C arranged at one end thereof communicating with the suction pipe 2.

A three stage pump is herein shown, the impellers B, B¹ and B² being supported on the shaft extending longitudinally through the casing and arranged within their respective chambers. The impeller B discharges into the chamber C¹ leading to the intake for the impeller B¹ and it in turn discharges into the chamber C² leading to the impeller B².

D is an outlet leading from the chamber C² and E is a suitable valve closing said outlet.

H is an outlet leading from the chamber containing the impeller B² and is closed by a suitable valve G.

The impellers B and B¹ are here shown rigidly connected to the main shaft but the impeller B² is rotatable on the shaft and is

provided with a suitable clutch face 3 adapted to be engaged by a clutch member 4 slidably and non-rotatively secured to the shaft.

5 is a rod extending outwardly from the clutch member 4 and operatively connected to a lever 6 here shown pivotally supported from the base, said clutch member being operated by said lever to connect or disconnect the impeller B² with the shaft.

A simple form of clutch mechanism is shown herein but any suitable form of clutch may be used.

In the operation of this pump, when the maximum head of pressure is required the valve E is closed and the clutch is operated to connect the loose impeller to the shaft. The fluid is thus passed through the several impellers and discharged through the outlet H. When a lesser head of pressure is desired the clutch is operated to disconnect the impeller B² and the valve G is closed and the valve E opened. The impeller B² then remains substantially at rest and as the outlet H is closed the fluid is discharged through the valve E receiving impetus only from the operating impellers. It will be readily understood that the pressure will thus be reduced and there will be no waste of energy as the impeller B² remains idle and does not interfere with the flow.

A three stage pump is herein shown and described but it must be understood that the invention may be readily applied to any desired form of multistage centrifugal pump and also that one or more impellers may be arranged so as to be connected or disconnected at will to vary the discharge pressure without departing from the spirit of the invention. Further, it must be understood that while multiple discharges are shown, one discharge opening may be used if desired the fluid in such construction passing through the idle impeller.

What I claim as my invention is—

1. In a centrifugal multistage pump, the combination with a casing having suction and discharge openings, of an impeller rotatably supported in said casing and adapted to be constantly operated, an impeller supported within said casing and journaled independent of the aforesaid impeller, and means adapted to operatively engage the latter impeller to cause it to rotate with the aforesaid impeller to vary the discharge pressure.

2. In a centrifugal multistage pump, the

combination with a casing having suction and discharge openings, of an impeller rotatably supported in the said casing toward the suction end and adapted to be constantly operated, an impeller independently journaled within said casing adjacent to the discharge, and means adapted to operatively connect the latter impeller to rotate with the aforesaid impeller to develop the maximum head pressure and to disengage the latter impeller to reduce the pressure.

3. In a centrifugal multistage pump, the combination with a casing having a suction opening and a plurality of discharge openings, of a constantly operating impeller operatively supported between the suction and first discharge openings, an idler impeller independently journaled between the discharge openings, means adapted to operatively connect or disconnect the idler im-

peller and the constantly operating impeller, and means for opening and closing the separate discharge openings.

4. In a centrifugal multistage pump, the combination with a casing having a suction opening and a plurality of discharge openings, a shaft journaled in said casing, a plurality of impellers arranged on said shaft and operating in said casing the impellers between the suction and first discharge being secured to the shaft and the remainder being loose thereon, suitable clutch means adapted to connect the loose impellers to rotate with the shaft, and suitable valves adapted to control the discharge openings.

THOMAS WILLIAM NICHOLLS HILLIARD.

Witnesses:

B. BOYD,

H. PRESTON.