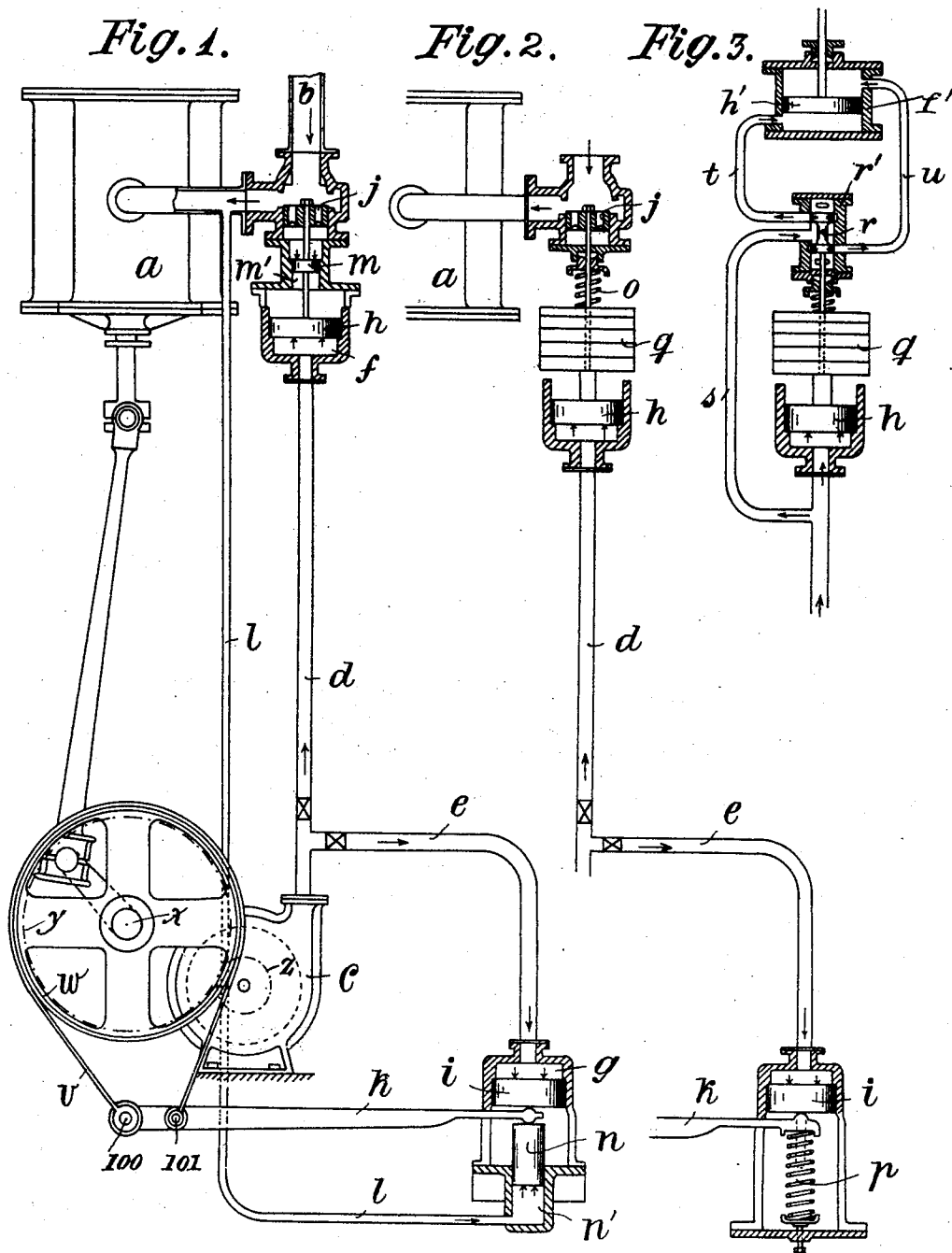


N. PEDERSEN.
SPEED REGULATOR.
APPLICATION FILED JAN. 4, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



Witness
Attest
P. H. Summers

Inventor,
Nils Pedersen.
by Henry Orthof
Atty.

No. 774,892.

PATENTED NOV. 15, 1904.

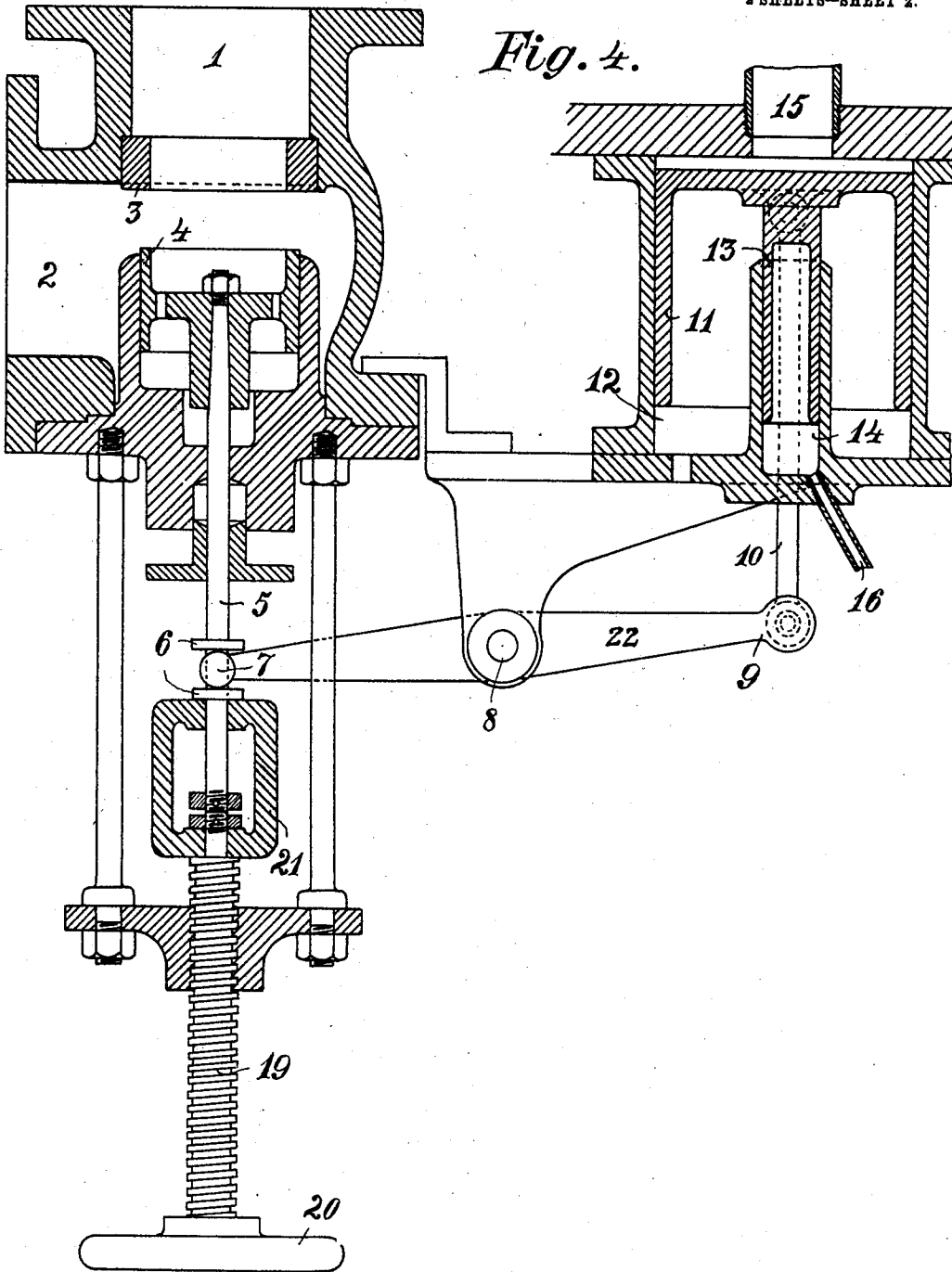
N. PEDERSEN.
SPEED REGULATOR.

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NO MODEL.

2 SHEETS—SHEET 2.

Fig. 4.



Witnessed:
W. H. Linnere

Inventor:
Nils Pedersen.
by Henry Orthof
Att'y

UNITED STATES PATENT OFFICE.

NILS PEDERSEN, OF BORREGAARD, NEAR SARPSBORG, NORWAY.

SPEED-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 774,892, dated November 15, 1904.

Application filed January 4, 1904. Serial No. 187,681. (No model.)

To all whom it may concern:

Be it known that I, NILS PEDERSEN, a subject of the King of Sweden and Norway, residing at Borregaard, near Sarpsborg, Norway, have invented certain new and useful Improvements in Devices for Regulating the Speed of Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to mechanism for controlling steam-actuated motors; and it consists of means to produce a hydraulic pressure on a suitable throttle-valve to control the quantity of steam supplied to the motor and means to load the motor by reason of a differential pressure exerted on one of its moving parts, as well as details of construction to be hereinafter described and claimed.

Referring to the drawings, in which like parts are similarly designated, Figure 1 is an elevation, partly in section, of mechanism to control the speed of a steam-engine. Fig. 2 is a similar view showing modifications of the brake and valve operating mechanisms directly operated by hydraulic means. Fig. 3 is a further modification of the throttle-valve-actuating mechanism. Fig. 4 is a vertical section of the throttle-valve and the parts operating it with means to independently operate the valve by hand.

A steam-cylinder *a* contains the usual piston operating the connecting-rod to drive the crank-shaft *x* of an engine. On this shaft is a brake-wheel *w* and a gear-wheel *y*, that drives a gear *z* on the centrifugal pump *c*. This pump supplies a valved branch pipe *e*, connected to a hydraulic cylinder *g*, in which is a piston *i*. Below the piston *i* is a steam-cylinder *n'*, having a piston *n* and which is connected by a steam-pipe *l* to the steam-supply pipe *b* of the steam-cylinder at the engine side of the throttle-valve. Pivoted at 100 is a brake-lever *k*, whose free end is held between the pistons *i* and *n*. One end of a brake-band *v* is connected to the lever at its pivot-point,

then passes around the brake-wheel *w*, and has its other end connected to the lever at 101. The centrifugal pump is also connected by a valved pipe *d* to a hydraulic cylinder *f*, in which is a piston *h*, whose stem is connected to a steam-piston *m* in a cylinder *m'*. The piston *m* is connected to and operates the throttle-valve *j* in the steam-supply pipe *b* of the engine.

Under normal conditions the steam-pressure on *m* and *n* is equalized or balanced by the water-pressure on the pistons *h* and *i*. When the speed of the engine increases, the speed of the centrifugal pump is also increased and produces a greater water-pressure, so that the pistons *h* and *i* are moved, the former actuating the piston *m* and throttle-valve *j* to cut off or partially cut off the supply of steam from pipe *b* to the engine, and the latter piston *i* being moved down carries with it the end of the brake-arm *k*, held between the pistons *i* and *n*, thereby tightening the brake-band *v* on the brake-wheel *w*.

In Fig. 2 there are shown means other than steam to produce a counter-pressure on the hydraulic pistons *h* and *i*. In this figure the general arrangement is the same, excepting that the throttle-valve *j* is not held open by steam-pressure, but by means of a spring *o*, surrounding the rod connecting the hydraulic piston *h* with the throttle-valve. One or more removable weights *q* may also be used to more accurately adjust the balance required, or the weights alone may be used by simply dispensing with this spring. The piston *i* is also shown acting on the end of the brake-arm *k*, which has a spring *p* opposing its motion.

It is not necessary that the piston *h* be connected to the throttle-valve or act directly on the end of the brake-beam. Said piston may be made to move valves controlling fluid-actuating devices to accomplish the same result. This is illustrated in Fig. 3, where the hydraulic piston *h* is connected to a distributing-valve *r*, controlling the admission of water from pipe *s*, which is a branch pipe from the one, *d*, directly connected to the centrifugal pump *c*. The throttle-valve is connected by a stem directly to a hydraulic piston *h'* in a

cylinder f' , and the valve-casing r' is connected by a pipe t to the cylinder f' at a point below its piston h' and by a pipe u to the cylinder f' above its piston h' , so that water can be distributed by the valve r to the top or bottom of said piston h' to positively actuate it and the throttle-valve connected thereto in either direction.

In Fig. 4, which shows a combined hand-actuated and automatic valve designed for use with this invention, 1 is the steam-inlet, and 2 the outlet to be connected to the engine. 3 is the throttle-valve seat, and 4 the valve itself. This valve is secured to a stem 5, as shown, which stem is provided with shoulders 6, between which the forked end of a lever 22 has bearing. This lever is pivoted at 8 to a suitable bracket, and the other end, 9, is connected by links 10 to a hydraulic piston 11 in the cylinder 12, that is connected by pipe 15 to the centrifugal pump. Within the piston 11 is a smaller piston 13, operating in a cylinder 14 concentric to and within the cylinder 12. Steam is supplied to the smaller cylinder 14 by pipe 16, leading to the boiler. The valve-stem 5 is connected to the screw 19 by means of coupling-piece or swivel-joint 21, that allows a certain amount of free longitudinal motion of the valve-stem when it is actuated by the lever 22. The screw 19 is operated by a hand-wheel 20, as shown. It will be seen that the function of this structure is the same as that of Fig. 1.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In governing mechanism, the combination with a cut-off valve, a hydraulic cylinder with a piston therein, a steam-cylinder and a piston therein, said valve, hydraulic piston and steam-piston rigidly connected, a centrifugal pump driven by the machine to be governed and connected to the hydraulic cylinder to produce water-pressure on the piston therein which pressure varies with the speed of the pump and tends to close said valve, substantially as set forth.

2. In governing mechanism, the combination with a throttle-valve and steam-actuated means to normally hold said valve open; of a hydraulic cylinder and a piston therein connected to the valve, and a centrifugal pump driven from the machine to be controlled to supply water to the hydraulic cylinder and piston therein, the water-pressure on which varies in accordance with the speed at which the pump is driven, substantially as set forth.

3. In a governing mechanism, the combination with a throttle-valve; of means to hold the valve normally open, a hydraulic cylinder, a piston therein connected to the valve,

a centrifugal pump driven by the machine to be governed and connected to said cylinder to produce water-pressure on the piston which varies in accordance with the speed of the pump and tends to close said valve, substantially as described.

4. The combination with a motor and the throttle-valve therefor, of a brake-wheel on the motor, a centrifugal pump driven by the motor, a brake acting on said wheel, hydraulic means connected to the pump to apply said brake and hydraulic means connected to the valve to actuate it, substantially as described.

5. The combination with a steam-engine and the throttle-valve therefor, of a hydraulic cylinder and piston, a centrifugal pump driven by the engine, a steam-piston to move the valve in one direction, a cylinder and a hydraulic piston therein to move it in an opposite direction, a brake-wheel on the engine, a brake-band engaging said wheel, a lever to operate the band, a cylinder and a hydraulic piston therein to move the brake-lever in one direction, a cylinder and a counter steam-piston therein to move the lever in an opposite direction, steam-pipe connections to the counter steam-piston, a centrifugal pump driven by the engine and pipe connections between the pump and the hydraulic cylinders to move the respective pistons in accordance with the varying pressure of the water due to the varying speed of the pump, substantially as described.

6. The combination of a steam-motor, of a throttle-valve, a hydraulic cylinder with a piston therein, a steam-cylinder with a piston therein arranged to exert pressure oppositely to that of the hydraulic piston, means to impart movement to the valve from the oppositely-disposed pistons, hand-operated means to independently actuate the valve and a centrifugal pump driven by the motor to exert hydraulic pressure on the hydraulic piston, substantially as and for the purposes set forth.

7. The combination with a motor and its throttle-valve, of a centrifugal pump driven by the motor and whose speed varies with that of the motor, said pump connected to the throttle-valve to move the same with variations of water-pressure, a brake to engage a revoluble element of the motor and oppositely-directed steam and hydraulic mechanism to produce a differential pressure on the brake, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

NILS PEDERSEN.

Witnesses:

ALFRED J. BRYN,
AUG. OLSEN.