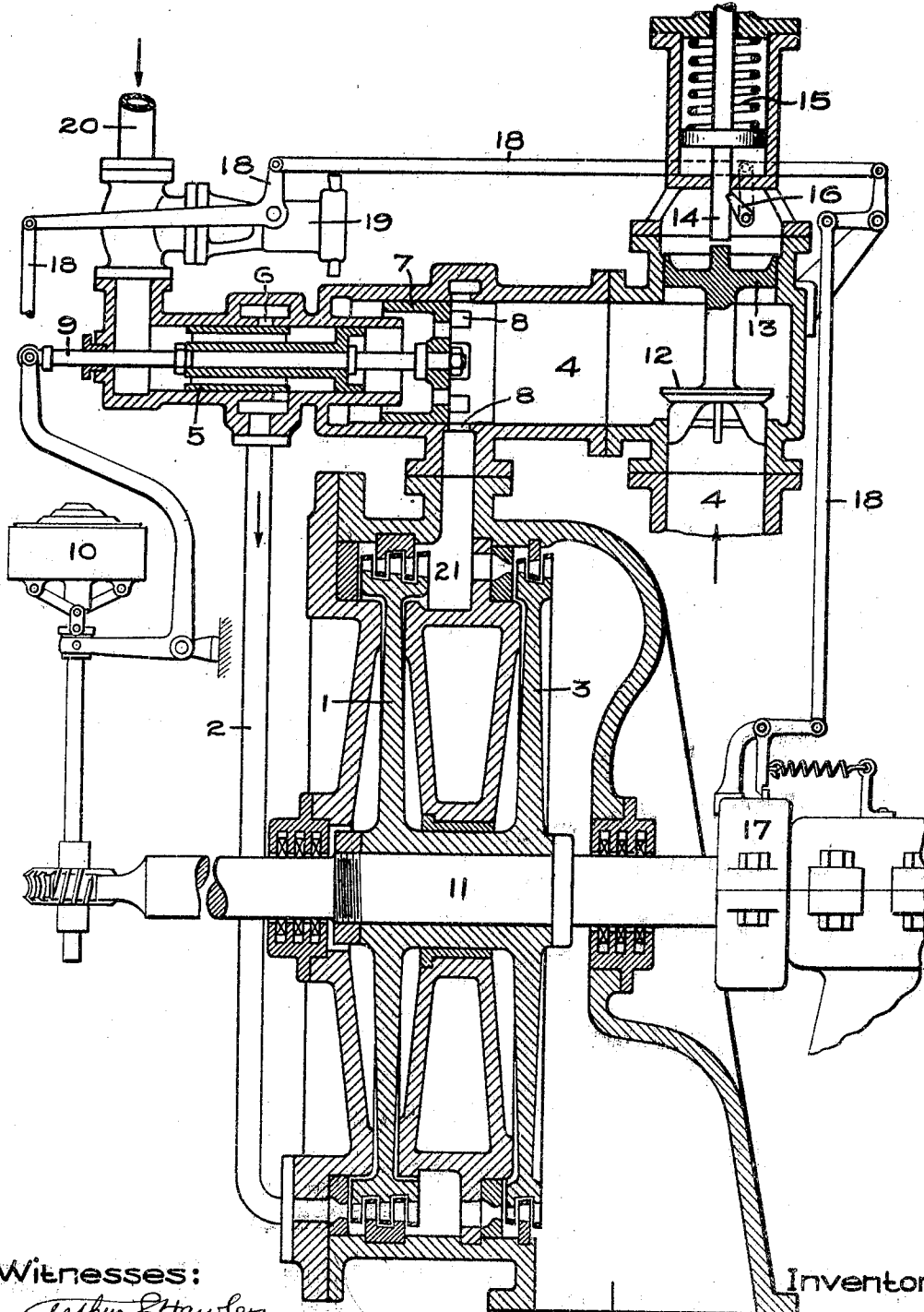


W. KIESER.
 PROTECTIVE DEVICE FOR TURBINES.
 APPLICATION FILED SEPT. 30, 1909.

1,020,703.

Patented Mar. 19, 1912.



Witnesses:

Arthur Hawley
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Inventor,

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 his Att'y.

UNITED STATES PATENT OFFICE.

WALTER KIESER, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY,
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PROTECTIVE DEVICE FOR TURBINES.

1,020,703.

Specification of Letters Patent. Patented Mar. 19, 1912.

Application filed September 30, 1909. Serial No. 520,358.

To all whom it may concern:

Be it known that I, WALTER KIESER, a citizen of Switzerland, residing at Berlin, Germany, have invented certain new and useful Improvements in Protective Devices for Turbines, of which the following is a specification.

This invention relates to elastic fluid turbines and especially to those driven by the exhaust steam from a high pressure reciprocating engine or engines, or other source. When such high pressure engines run intermittently, it is customary to discharge the exhaust steam into an accumulator, which furnishes a steady supply to the turbine. In other cases no accumulator is used. But if too little steam is supplied directly or through the accumulator it may happen that the pressure will fall below atmospheric pressure. In this event the pressure in the turbine casing would tend to drop below atmospheric pressure also, which would cause a suction of air into said casing. Or, if the turbine is connected with the live steam main in order to supplement the supply of low pressure steam, this drop below atmospheric pressure in the accumulator would tend to drain off the live steam from the turbine into the accumulator.

The object of the present invention is to prevent these and other difficulties, and to this end the invention consists in a check valve in the pipe supplying the low pressure steam arranged to be closed automatically by the atmospheric pressure when it exceeds that of the steam in said pipe. This valve moreover is used as an emergency cutoff in case the turbine races. The turbine is also supplied with live steam to supplement the low pressure supply when necessary and a quick-closing cutoff valve in the live steam pipe is connected with the emergency mechanism so that it too will be closed simultaneously with the valve in the exhaust steam pipe.

The accompanying drawing illustrates one embodiment of my invention, the mechanism being shown partly in section, and to a certain extent diagrammatically.

The turbine selected to illustrate the invention is a two stage machine, having one wheel 1 supplied with live steam through the conduit 2 and the other wheel 3 supplied with exhaust steam through the conduit 4, which preferably communicates with

the exhaust side of the first wheel, but the invention is not limited to this type of turbine. The admission of live steam is controlled by a slide valve 5 moving over the ports 6, while the admission of exhaust steam is controlled by the valve 7 cooperating with the ports 8. Both valves are actuated simultaneously by the rod 9 which is connected in any suitable manner with a centrifugal speed governor 10 driven from the shaft 11 of the turbine.

In the conduit 4, between some suitable source of supply of exhaust steam (not shown) and the valve 7, is located the check valve 12, arranged to close toward the source, so that under ordinary conditions it will be opened by the steam flowing to the turbine. The check valve is connected with a movable abutment, preferably a piston 13 on the stem of the valve. One side of the piston is exposed to the pressure of the exhaust steam after it passes the valve, while the other side of said piston is exposed to the atmospheric pressure. Mounted in a frame above said piston, and in line with the line of movement thereof, is a hammer, preferably a rod 14 urged downwardly by a spring 15, but held in a raised position by a latch 16. On the shaft of the turbine is an emergency governor 17, which, when the turbine exceeds a predetermined speed, operates to trip said latch, through suitable mechanism, such as the rods and levers 18. This mechanism is also connected to a quick-closing valve 19 which controls the flow of live steam through the pipe 20 to the first stage of the turbine.

The operation of the invention is as follows: The exhaust steam flowing through the conduit 4 raises the check valve 12 and holds it open so long as the pressure of said exhaust steam is above that of the atmosphere, the lower end of the rod 14 serving at the same time to limit the upward movement of the valve. If, however, the exhaust steam falls below atmospheric pressure, the check valve is immediately closed by the piston 13, and thus prevents any suction of air into the turbine casing, or any robbery of live steam coming from the first stage into the chamber 21 from which it should properly flow to the second stage wheel.

In case the load on the turbine is suddenly reduced so that the machine begins to race, the emergency governor 17 trips the latch

16 and permits the hammer to shut the valve 12 forcibly and hold it closed. This cuts off the supply of exhaust steam. At the same time the mechanism 18 which trips the latch also releases the quick-closing valve 19, which shuts off the live steam. The turbine is thus prevented from racing, and will not operate until the engineer raises the hammer rod 14 and opens the valve 19.

10 In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but 15 I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure 20 by Letters Patent of the United States is,

1. The combination with a turbine supplied with steam from a suitable source, of a valve for shutting off the supply, a hammer adapted to close and hold said valve closed 25 against the pressure of the supply, and an emergency governor for said turbine adapted to release said hammer.

2. The combination with a turbine supplied with low pressure steam from a suitable source, of a valve for shutting off said 30 supply, a spring-actuated rod in line with said valve, a latch locking said rod in an inoperative position, and an emergency governor for tripping said latch.

3. The combination with a turbine supplied with live steam and also with exhaust steam, of a quick-closing valve in the live steam pipe, a check valve in the exhaust steam conduit, an emergency governor, and 35 operative connections whereby said governor effects the closing of both valves when the turbine races.

4. The combination with a turbine supplied with exhaust steam from a suitable 45 source, of a check valve in the exhaust steam supply conduit adapted to be closed automatically by atmospheric pressure when the steam pressure falls below that of the atmosphere, and means for automatically closing 50 said valve when the turbine races com-

prising a spring actuated rod arranged in line with the valve, a latch that normally holds the rod out of engagement with the valve, and an emergency governor that releases the latch and permits the rod to engage the valve to close it. 55

5. In combination, a turbine, a conduit for supplying high pressure steam to the turbine, a conduit for supplying low pressure steam to the turbine, a valve for regulating the admission of high pressure steam 60 from the first conduit to the turbine, a valve for regulating the admission of steam from the low pressure conduit to the turbine, and a valve in the low pressure conduit adapted 65 to be closed automatically by atmospheric pressure when the pressure of the low pressure steam falls below atmospheric.

6. In combination, a turbine, a conduit supplying high pressure steam to the initial stage or region of the turbine, a conduit for supplying low pressure steam to a region of lower pressure in the turbine, a valve for regulating the admission of steam 70 from the high pressure conduit to the turbine, a valve for regulating the admission of steam from the low pressure conduit to the turbine, a governing mechanism for controlling said valves, and a valve in the low 75 pressure conduit adapted to be closed automatically by atmospheric pressure when the pressure of the low pressure steam falls below atmospheric.

7. The combination with a turbine supplied with high pressure and also with low 85 pressure steam, of a valve in the high pressure supply pipe, a valve in the low pressure supply pipe adapted to be closed automatically by atmospheric pressure when the steam pressure falls below that of the atmosphere, an emergency governor, and connections between the governor and said 90 valves that effect the closing of both valves when the turbine races.

In witness whereof, I have hereunto set 95 my hand this 11th day of September, 1909.

WALTER KIESER.

Witnesses:

LUDWIG CÜBELIC,
OSKAR DAHLKE.