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G. W. WILDIN ET AL

SPEED CONTROL DEVICE

Filed July 3, 1924

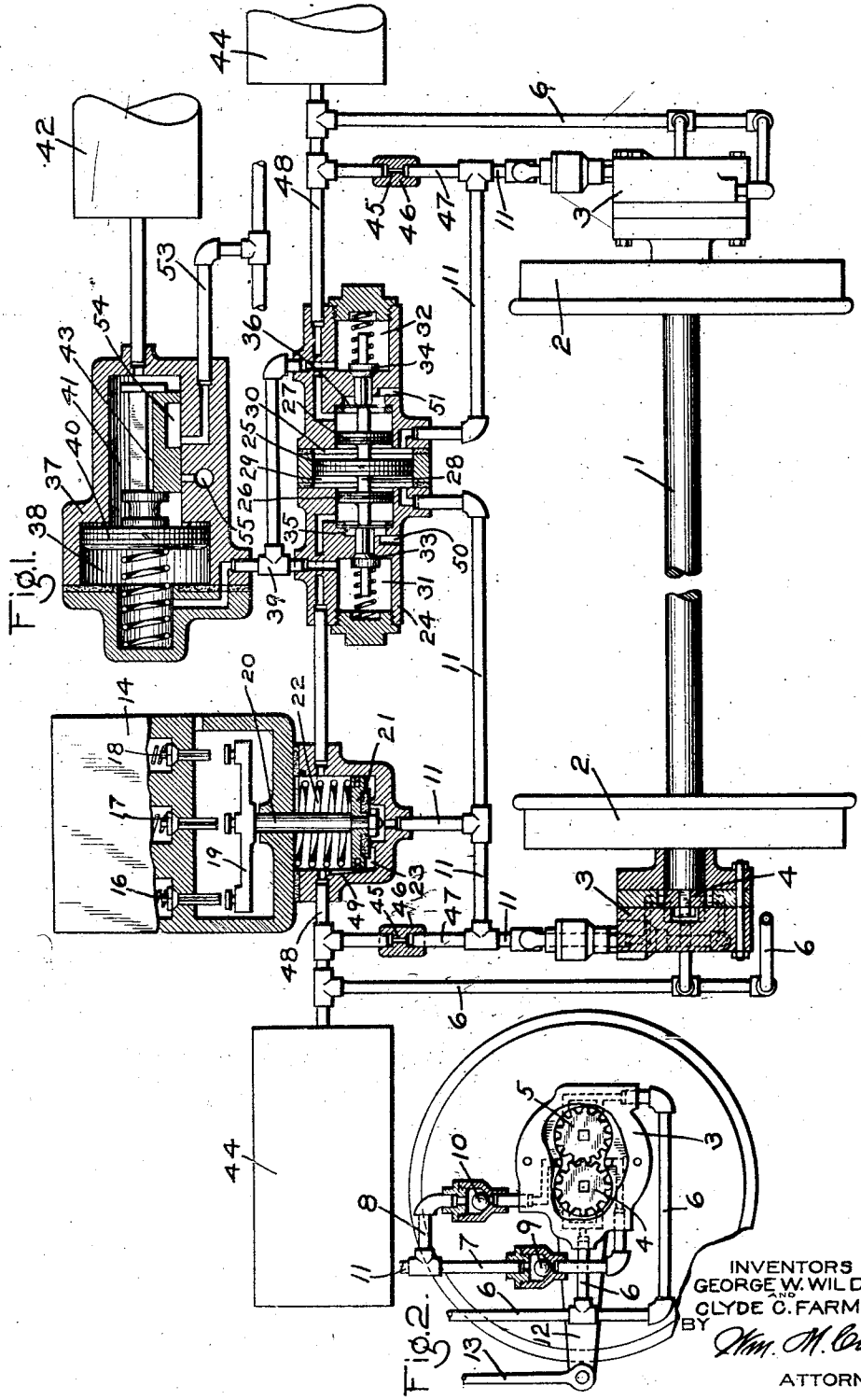


Fig. 1.

Fig. 2.

INVENTORS
GEORGE W. WILDIN
AND
CLYDE C. FARMER.
BY
Wm. M. Cady
ATTORNEY

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GEORGE W. WILDIN AND CLYDE C. FARMER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNORS TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF WILMERDING, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

SPEED-CONTROL DEVICE.

Application filed July 3, 1924. Serial No. 724,011.

To all whom it may concern:

Be it known that we, GEORGE W. WILDIN and CLYDE C. FARMER, citizens of the United States, and residents of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have jointly invented certain new and useful Improvements in Speed-Control Devices, of which the following is a specification.

This invention relates to speed controlled devices, and more particularly to an automatic train speed controlling equipment.

The prinicipal object of our invention is to provide an improved train speed controlled apparatus in which a momentum pump is utilized as the speed governor.

In the accompanying drawing; Fig. 1 is a diagrammatic view, partly in section, of a speed control apparatus embodying our invention; and Fig. 2 an end view of the momentum pump portion of the construction shown in Fig. 1.

In the drawing, the reference numeral 1 indicates a car truck axle and 2 the car wheels secured to the axle. Carried at each of the outer ends of the axle 1 is an oil or other liquid pump, each comprising a casing 3. Mounted in said casing and secured to the axle 1 is a pump gear wheel 4 which meshes with a similar gear wheel 5, so that the rotation of the gears operates to pump liquid in the well known manner. A liquid supply pipe 6 leads to each gear wheel at the outer portion and discharge pipes 7 and 8 are connected to the space intermediate the gears, one above and the other below the gears, so that when the vehicle is running in one direction the pump discharges liquid into one discharge pipe and when running in the reverse direction into the other discharge pipe. The discharge pipes 7 and 8 contain check valves 9 and 10, so as to prevent back flow, according to which discharge pipe is out of service and said discharge pipes are connected to a common pipe 11. In order to prevent rotative movement of the pumps, each pump casing is provided with a torque arm 12 which is connected to one end of a link 13 having the other end secured to the vehicle frame.

A speed limit controlling device is provided comprising a casing 14 in which are mounted a plurality of valves, such as the valves 16, 17, and 18 and having stems of different lengths adapted to be engaged upon movement of a cross head 19.

The cross head 19 is connected by a piston rod 20 to a piston 21, subject on one side to the pressure of a spring 22 and having the chamber 23 at the opposite side connected to the pump discharge pipe 11 of one of the momentum pumps 3.

What may be termed a safety governor is provided comprising a casing 24 containing a piston 25 and pistons 26 and 27 of smaller area carried by a piston stem 28 of piston 25 and disposed at opposite sides of the piston 25. The chamber 29 between pistons 25 and 26 is connected to the discharge pipe 11 of one momentum pump and chamber 30 between pistons 25 and 27 is connected to the discharge pipe 11 of the other pump.

Mounted in valve chambers 31 and 32 at opposite sides of the pistons 26 and 27 are valves 33 and 34, the respective stems of which engage flexible diaphragms 35 and 36. The inner faces of said diaphragms are engaged by the opposite extended ends of the piston stem 28, so that movement of the piston 25 in either direction from its normal intermediate position, will operate through one of the diaphragms to open the corresponding valve.

A brake application valve device is provided comprising a casing 37 having a piston chamber 38 connected by pipe 39 to the valve chambers 31 and 32 and containing piston 40 and having a valve chamber 41, supplied with fluid under pressure from reservoir 42 and containing a slide valve 43 adapted to be operated by piston 40.

Each pipe 6 is connected to a liquid supply reservoir 44 and when the pumps are operating, circulation of liquid is effected through a restricted port 45 of a choke plug 46 which is interposed in pipe 47, connecting discharge pipe 11 with pipe 48.

As, for example, in Patent No. 1,316,205, of W. V. Turner, dated September 16, 1919, the valves 16, 17, and 18 are adapted to be opened according to the speed at which the train is running and when the train control apparatus is set into operation to determine the speed limit of the train, one of the valves is rendered operative, so that when opened upon the speed of the train exceeding the particular speed limit for that valve, an ap-

plication of the brakes is effected for the purpose of reducing the speed of the train. The valves shown may be designed as the high speed limit valve 18, the medium speed limit valve 17, and the low speed limit valve 16.

In operation, when the train is running, the pumps 3 operate to discharge liquid through the discharge pipes 11 at a pressure proportional to the speed of the vehicle and the pressure of liquid pumped by one pump then acts in the chamber 23 on the face of piston 21. As the speed increases, the pressure of liquid pumped becomes greater and this pressure causes an upward movement of piston 21 in proportion to the pressure exerted by the liquid. It will thus be seen that the cross head 19 will be moved in accordance with the speed of the train and if the train control apparatus is set to limit the speed of the train to the low speed limit, then when this speed is exceeded the valves 16 will be opened by the movement of cross head 19 and the opening of said valve will operate to effect an application of the brakes so as to reduce the speed of the train.

If the train control apparatus is set to limit the speed of the train to the medium speed, the valve 17 will be rendered operative, so that when the medium speed limit is exceeded, the cross head will be moved so as to open the valve 17 to effect an application. If the train control apparatus is set for high speed, the speed will not be reduced until the speed exceeds the high speed limit, and the pressure of liquid on piston 21 has been increased so that the cross head 19 is moved sufficiently to open the high speed valve 18.

The restricted port 45 permits circulation of liquid from the pump back to the reservoir 44 and is of such size that the pressure in pipe 11 and on the face of piston 21 will increase at the desired rate as the speed of the train increases in order to provide the desired movement of the cross head 19. The regulation of the pressure of liquid in proportion to the speed of the vehicle may be assisted by providing a leakage groove 49 around the piston 21 which varies in effective area as the piston 21 moves upwardly, so that an increased flow area is provided in proportion to the upward movement of the piston, which tends to prevent possible building up of excessive pressure on piston 21, the pipe 48 being connected to the spring chamber of piston 21, so that flow of liquid past the piston will be returned to the reservoir 44.

The safety governor 24 is provided as a protective feature against the possibility of the pump failing or of the discharge pipe breaking.

Normally, both of the pumps 3 are operating and the pressure of liquid supplied by each pump is substantially the same and acts in the chambers 29 and 30 of the safety governor device. So long as the pressure of liquid delivered by both pumps is equal, the piston 25 will be maintained in its normal intermediate position, as shown in Fig. 1. If, however, the pipe 11 leading from one of the pumps should become broken, or one of the pumps should fail to pump liquid, then pressure of liquid produced by the other pump will be effective to operate the piston 25.

For example, should the left hand discharge pipe 11 break, the pressure in chamber 29 will fall and the pressure in chamber 30 will then act on the differential, unbalanced area of piston 25 to shift same toward the left. This movement will operate to open the valve 33 and fluid under pressure will be vented from piston chamber 38 of the application valve device to exhaust port 50. The application piston 40 will then be shifted to its outer position by the fluid pressure in valve chamber 41 and the slide valve 43 will be operated so as to connect the brake pipe 53 through cavity 54 with an exhaust port 55. The reduction in brake pipe pressure thus produced operates to effect an application of the brakes in the usual well known manner.

Having now described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In a speed controlling device, the combination with a plurality of valves for determining the speed of the train and fluid pressure actuated means for serially operating said valves, of a fluid pump for supplying fluid to said means at a pressure proportional to the speed of the vehicle.

2. In a speed controlling device, the combination with a plurality of valves operative to determine the speed of the train and means operated by liquid under pressure for serially operating said valves, of a liquid pump for supplying liquid to said means at a pressure proportional to the speed of the vehicle.

3. In a speed controlling device, the combination with a plurality of valves operative to determine the speed of the train and means operated by fluid under pressure for serially operating said valves and including a movable abutment subject to the opposing pressure of a spring and a chamber, of a vehicle driven pump for supplying fluid to said chamber at a pressure corresponding with the speed of the vehicle.

4. In a speed controlling device, the combination with a pair of vehicle driven liquid pumps, of vehicle speed controlling means governed according to the pressure of liquid supplied by one pump and means operated by the pressure of liquid from the other pump for reducing the speed of the vehicle

upon failure of pressure on said first mentioned vehicle speed controlling means.

5. In a speed controlling device, the combination with a pair of vehicle driven liquid pumps, of means subject to the opposing pressures of liquid supplied by said pumps and operated upon loss of pressure from one pump to effect a reduction in the speed of the vehicle.

6. In a speed controlling device, the combination with a pair of vehicle driven liquid pumps, of means subject to the opposing pressures of liquid supplied by said pumps and a device controlled by said means for effecting a reduction in the speed of the vehicle upon loss or failure of pressure on said means as supplied from one pump.

7. In a speed control device, the combination with an application valve device operated upon a reduction in fluid pressure for effecting an application of the brakes, of valves for venting fluid from said valve device, a piston for operating said valves, and a pair of fluid pumps operated by a vehicle for supplying fluid to opposite sides of said piston, said piston being operated upon failure of fluid pressure from one pump to open one of said valves.

8. In a speed control device, the combination with an application valve device operated upon a reduction in fluid pressure for effecting an application of the brakes, of valves for venting fluid from said valve device, a piston for operating said valves, differential area pistons movable with the main piston and forming a chamber at each side of the main piston, and a pair of vehicle driven fluid pumps, each supplying fluid under pressure to one of said chambers, said main piston being operated to open one of said valves upon loss of fluid pressure from one pump.

9. In a speed controlling device, the combination with means including a piston subject to variations in fluid pressure for controlling the speed of the vehicle, of a vehicle driven fluid pump for supplying fluid to said piston at a pressure corresponding with the speed of the vehicle, said piston having a leakage groove through which fluid pressure can pass from one side to the other side of the piston.

10. In a speed controlling device, the combination with means including a piston subject to variations in fluid pressure for controlling the speed of the vehicle, of a vehicle driven fluid pump for supplying fluid to said piston at a pressure corresponding with the speed of the vehicle, said piston having a groove controlled by said piston and adapted to permit an increased flow of fluid from the fluid pressure side of the piston to the other side as the piston is moved by an increase in fluid pressure supplied by the pump.

11. In a speed controlling device, the combination with means including a piston subject to variations in fluid pressure for controlling the speed of the vehicle, of a vehicle driven fluid pump for supplying fluid to said piston at a pressure corresponding with the speed of the vehicle, said piston having a by-pass around the piston adapted to permit flow of fluid from the fluid pressure side of the piston at an increasing rate in proportion to the movement of the piston.

12. In a speed control device, the combination with means governed by variations in liquid pressure for controlling the speed of a vehicle, of a vehicle driven liquid pump for supplying liquid to said means at a pressure corresponding with the speed of the vehicle, a reservoir from which liquid is supplied to said pump, and means having a restricted port through which liquid supplied under pressure from the pump is returned to the reservoir.

In testimony whereof we have hereunto set our hands.

GEORGE W. WILDIN.
CLYDE C. FARMER.