Dec. 17, 1935. L. K. SILLCOX 2,024,394

FLUID PRESSURE BRAKE

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Fig. 1

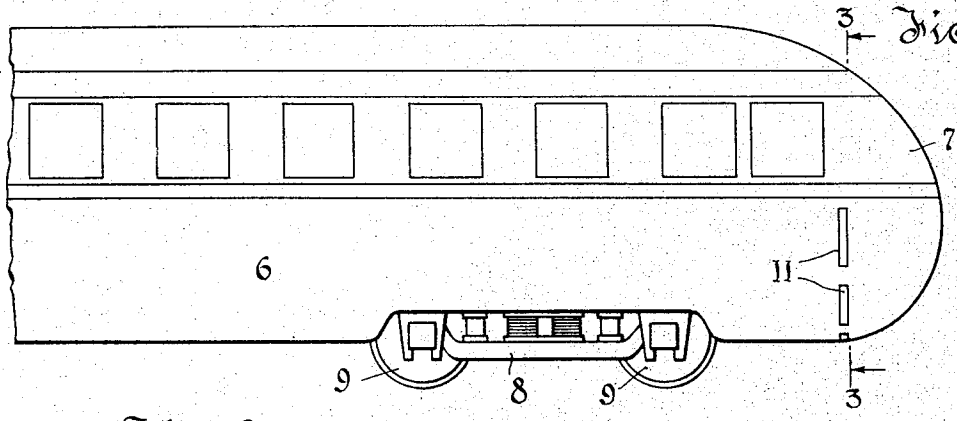
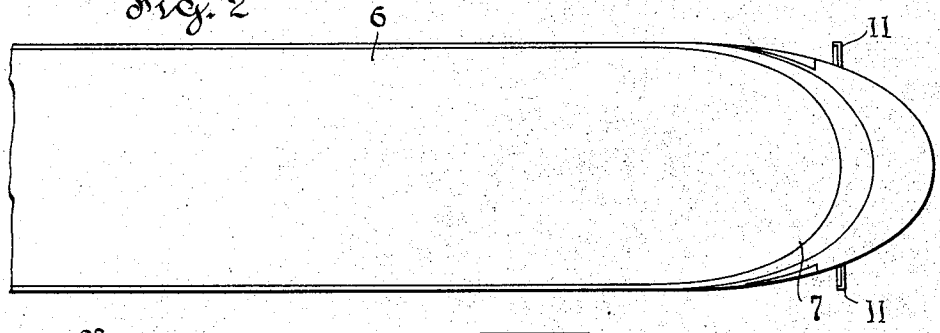


Fig. 2



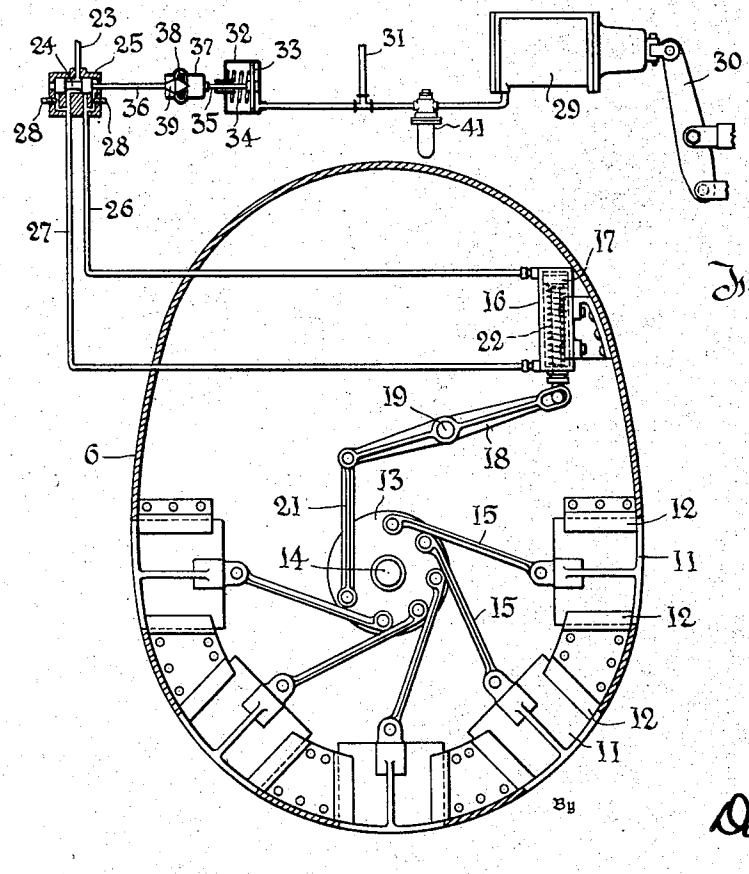


Fig. 3

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FLUID PRESSURE BRAKE

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12 Claims. (Cl. 303—6)

This invention relates to braking mechanisms and particularly to fluid pressure brakes for high speed trains of the modern stream lined type.

In the operation of such high speed trains one of the major problems is to ensure stopping distances short enough to permit operation of high speed trains on tracks equipped with block signals characterized by the present signal spacing. The maximum retardation practicable with wheel brakes does not give stopping distances as short as would be desirable in some emergencies.

The purpose of the present invention is to produce a wind resistance brake which operates very effectively at high train speeds, and functions to apply a retarding force preferably, but not necessarily, exclusively at or near the rear of the train. Another feature of the invention is the provision of means to bring the wind resistance brake into action as an incident to an emergency application of the wheel brakes and then to take it out of action as the train slows down.

A preferred embodiment of the invention will now be described by reference to the accompanying drawing, in which,—

Fig. 1 is a side elevation of the rear portion of a stream lined car, with the invention applied.

Fig. 2 is a plan view of the same, showing the position assumed by the vanes when projected.

Fig. 3 is a section on the line 3—3 of Fig. 1, showing in diagram the relation between a brake cylinder which serves to apply wheel brakes and the motor which projects and retracts the vanes.

A portion of a passenger car body is indicated at 6, the rear end being tapered according to known principles of stream lining, as indicated at 7. The rear truck is shown at 8 and two wheels at 9. Fluid pressure brakes are applied to the wheels, 9, but are not visible on Fig. 1.

A series of vanes 11 are mounted in guides 12, so as to be capable of being projected through slots in the car wall into the stream of air adjacent the car. When retracted the ends of the vanes 11 are flush with the outer surface of the car wall.

These vanes 11 are located in a plane indicated by the line 3—3 in Fig. 1, and transverse to the tapered rear end of the car. The distance the vanes may be projected is such that their extremities lie preferably within the maximum transverse dimensions of the car, and in any case are within the clearance limits of the track upon which the car runs.

The vanes 11 are actuated by rotating reversely, through a moderate angle, a disk 13 journaled at 14 and connected by links 15 with respective vanes 11. A double-acting fluid-pressure actuated piston motor having a cylinder 16 and piston 17 is connected by lever 18 pivoted at 19 and link 21, to rotate the disk 13 in reverse directions. A compression spring 22 may be used to exert a moderate retracting force on the piston and consequently on the vanes.

Pressure fluid to actuate the motor is supplied from any suitable source through pipe 23, to a distributing valve 24 of the balanced piston type enclosed in valve chest 25. This valve is shown in Fig. 3 as of the inside cut-off and end exhaust variety, and is connected by pipes 26 and 27 with the two ends of cylinder 16. The exhaust ports in chest 25 are shown as equipped with threaded throttling means 28 designed to secure cushioning of piston 17 near the ends of its strokes.

When valve 24 is to the left, as shown, piston 17 and vanes 11 are retracted. When the valve is shifted to the right the piston moves outward (downward) projecting vanes 11.

In Fig. 3 is shown a brake cylinder 29 arranged to operate wheel brakes typified by a portion of the foundation brake gear 30. Air to operate cylinder 29 arrives through pipe 31 from any suitable brake valve (not shown).

A branch of pipe 31 leads to cylinder 32 so that pressure in cylinder 29 also acts on cylinder 32 to force piston 33 to the left against the resistance of a loading spring 34. Spring 34 is initially so stressed that it yields only after emergency pressure (say 50 pounds per square inch) has been developed in cylinder 29.

Between piston rod 35 and valve stem 36 (connected to valve 24) is a quick throw device comprising a housing 37 having a groove in which a contractile annular spring 38 is confined. Spring 38 encircles a reversely tapered cam 39 and if forced over the middle portion of the cam reverses its reaction on the cam.

Thus as piston 33 moves to the left it first urges valve 24 to the left, but at a critical point in the piston's motion the spring 38 rides over the large diameter of the cam and snaps valve 24 to the right. Similar, but reverse action, takes place on reverse motion of piston 33. Thus valve 24 is always urged to one or the other limit of motion and shifts suddenly so that all wavering or uncertain action is avoided.

The use of a quick throw mechanism between piston 33 and valve 24 is desirable to ensure precise operation, but the specific form of the quick throw mechanism is subject to considerable variation.

In ordinary applications the pressures in cylinder 29 will not be great enough to shift valve 24 to operate piston 17, but an emergency application will be severe enough initially to shift valve 24 and cause vanes 11 to be projected.

It is common practice in the air brake art, particularly in high speed service, to provide automatic means which gradually reduce the intensity of an emergency application, so that the wheels will not lock as the train slows. The pres-

sure in cylinder 29 may be so controlled, for example by the high speed vent valve 41, with the result that vanes 11 will be projected at the commencement of an emergency application when train speed is high and consequently when the vanes are highly effective; and then retracted as the result of reduction of brake cylinder pressure. This occurs after the train slows, but before it stops, and while the wheel brakes remain applied.

What is claimed is,—

1. The combination of a vehicle having primary braking means and secondary braking means; a brake cylinder for actuating said primary braking means; reversible motor means for shifting said secondary braking means between active and inactive positions; and means responsive to brake cylinder pressure for controlling said reversible motor means.

2. The combination of a vehicle having primary braking means and secondary braking means; a brake cylinder for actuating said primary braking means; reversible motor means for shifting said secondary braking means between active and inactive positions; and means responsive to brake cylinder pressure for controlling said reversible motor means, and arranged to function as brake cylinder pressure passes above and below a critical value to render said secondary means active and inactive.

3. The combination of a vehicle having primary braking means and secondary braking means; a brake cylinder for actuating said primary braking means; reversible motor means for shifting said secondary braking means between active and inactive positions; means responsive to brake cylinder pressure for controlling said reversible motor means, and arranged to function as brake cylinder pressure passes above and below a critical value to render said secondary means active and inactive; and means for gradually reducing brake cylinder pressure from a value above, to a value below, said critical value.

4. The combination of a vehicle having friction brakes; a brake cylinder for applying said brakes; wind resistance braking means; motor means for shifting the last-named braking means between active and inactive positions; and means responsive to brake cylinder pressure for actuating said motor means.

5. The combination of a vehicle having friction brakes; a brake cylinder for applying said brakes; wind resistance braking means; motor means for shifting the last-named braking means between active and inactive positions; and means responsive to brake cylinder pressure for actuating said motor means, and arranged to function as brake cylinder pressure rises above and falls below a critical value to render said wind resistance braking means respectively active and inactive.

6. The combination of a vehicle having friction brakes; a brake cylinder for applying said brakes; wind resistance braking means; motor means for shifting the last-named braking means between active and inactive positions; means responsive to brake cylinder pressure for actuating said motor means, and arranged to function as brake cylinder pressure rises above and falls below a critical value to render said wind resistance braking means respectively active and inactive; and automatic means for gradually reducing brake cylinder pressure to a value below said critical value.

7. The combination of a vehicle having friction brakes; a brake cylinder for applying said brakes; wind resistance braking means; reversible fluid pressure motor means for shifting the last named braking means between active and inactive positions; a distributing valve controlling the reversal of said motor; a loaded abutment subject to brake cylinder pressure; and a quick throw actuating connection between said abutment and said distributing valve.

8. The combination of a vehicle having friction brakes; a brake cylinder for applying said brakes; wind resistance braking means; reversible fluid pressure motor means for shifting the last named braking means between active and inactive positions; a distributing valve controlling the reversal of said motor; a loaded abutment subject to brake cylinder pressure; a quick throw actuating connection between said abutment and said distributing valve; and automatic means for gradually reducing brake cylinder pressure from an intensity at which the wind resistance brake is rendered active to an intensity at which it becomes inactive.

9. The combination of a vehicle; a plurality of wind resistance vanes; means for guiding said vanes between active and inactive positions; a shiftable member; operative connections between said member and vanes whereby shifting of the member shifts said vanes in unison; and a reversible double acting fluid pressure motor for shifting said member.

10. The combination of a vehicle; a plurality of wind resistance vanes; means for guiding said vanes between active and inactive positions; a shiftable member; operative connections between said member and vanes whereby shifting of the member shifts said vanes in unison; a reversible motor for shifting said member; a reversing valve controlling said motor; friction braking means; and means responsive to a critical intensity of the force with which said friction braking means are applied, operatively connected to actuate said reversing valve.

11. The combination of a vehicle; a plurality of wind resistance vanes; means for guiding said vanes between active and inactive positions; a shiftable member; operative connections between said member and vanes whereby shifting of the member shifts said vanes in unison; a reversible double acting fluid pressure motor for shifting said member; a reversing valve controlling said motor; friction braking means; valve actuating means shiftable proportionally to the energization of said friction braking means; and a quick throw connection between said valve actuating means and said reversing valve.

12. The combination of a vehicle; a plurality of wind resistance vanes; means for guiding said vanes between active and inactive positions; a shiftable member; operative connections between said member and vanes whereby shifting of the member shifts said vanes in unison; a reversible motor for shifting said member; a reversing valve controlling said motor; friction braking means; valve actuating means shiftable proportionally to the energization of said friction braking means; a quick throw connection between said valve actuating means and said reversing valve; and automatic means rendered effective by intense energization of the friction braking means to reduce such energization gradually.

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