Introduction of WEVB

Safe braking system named WEVB (wing type exhaust valve brake) is know-how technique that WEICHAI POWER Company bought from German MAN Company. This technique has been a standard configuration with heavy duty trucks in the developed countries, and has been legislated as rule of law for incorporation of the structure.

Function

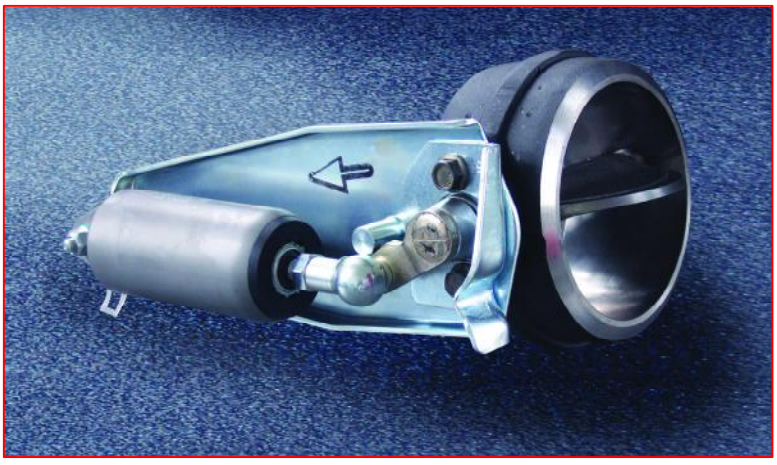
Main function of this mechanism is that when a truck needs to reduce its speed, it can increase the braking moment produced by the diesel engine to make the vehicle progressively reduce or stabilize its speed. By using this mechanism, the control performance of the vehicle is effectively improved, and running safety is ensured on the downhill path in the hilly area, braking system may not be frequently used so that the wearing of the braking system is relieved as a result. Moreover, the running cost of the whole vehicle will be reduced with economical operation achieved. It is unnecessary for driver to cool down the tyres with water on the downhill path. Because of less braking times, driving strength is also relieved and driving and riding become more comfortable.

Operation principle

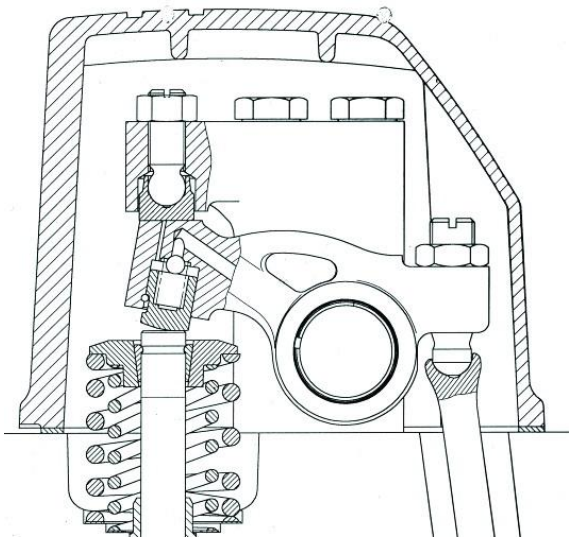
Conventional exhaust brake device works in such manner that by closing the exhaust passage with a wing valve, the piston gets a counter pressure during exhaust stroke to resist running of engine to produce a braking action so as to achieve the

purpose of controlling the vehicle speed.

Wing-type exhaust valve brake (WEVB) is developed on the base of conventional wing-type exhaust valve auxiliary brake device. When wing-type throttle valve is closed, the diesel engine works similar to operation of compressor under dragging of vehicle gravity, pressure of exhaust gas is swiftly increased in the exhaust passage, pressure wave produced by exhaust gas from adjacent cylinders will cause the exhaust valve of the cylinder next to lower dead point of intake stroke opening out of control. Exhaust valve brake (EVB) is designed to utilize the phenomenon that exhaust valve is automatically opened under action of pressure wave during braking process, by adding a set of execution mechanism for controlling of travel of exhaust valve to realize opening of exhaust valve with a gap being kept so as to enhance braking efficiency of engine.

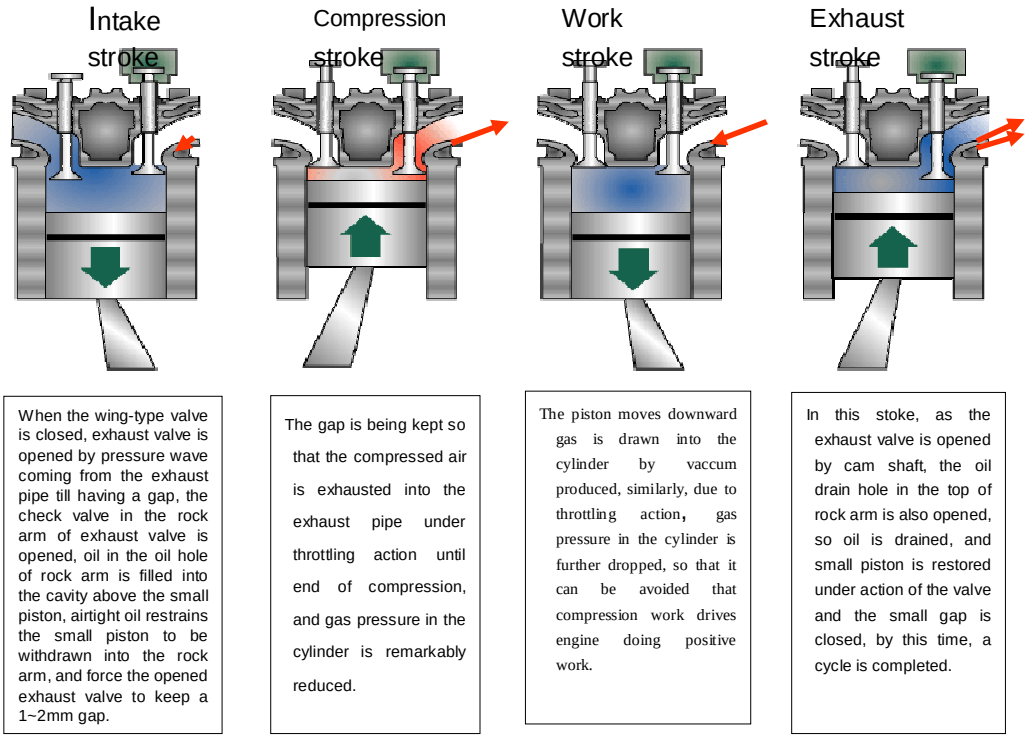


Wing-type exhaust valve

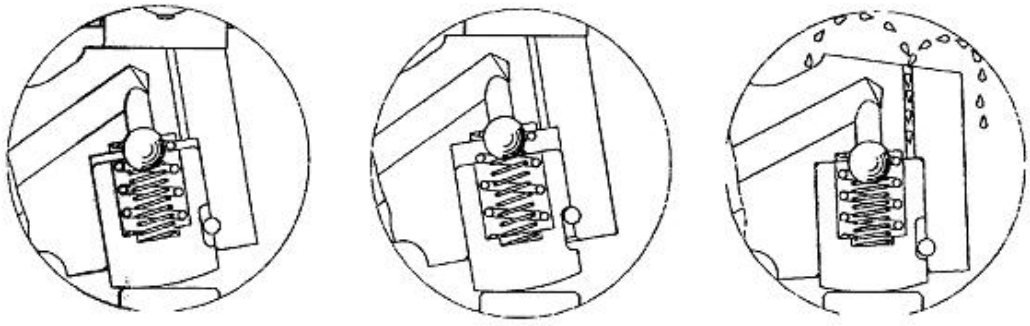


Structural schematic of WEVB

When the exhaust valve is opened by pressure wave, small piston in the exhaust valve braking mechanism follows the exhaust valve to move up and down by its self-gravity and spring action, in this case, check valve opens to make the cavity above the small piston filled up with engine oil, besides, as oil sealing face of exhaust valve rock arm is tightly close to that of oil sealing screw during the process above mentioned and subsequent compression and work strokes, the oil drain hole is closed, therefore, airtight oil above the small piston restrains the small piston to be withdrawn into the rock arm and forces the exhaust valve to be open. In successive compression and work strokes, a 1~2mm travel remains all the time. When the exhaust stroke starts, by the movement of rock arm, the exhaust valve is fully opened, and oil drain hole in the rock arm of exhaust valve is opened to spray oil out, and the small piston which extends out restores under the pressure of exhaust valve. The process above mentioned reciprocates so that the braking power of diesel engine is increased.



Operation principle sketch of WEVB



Intake stroke Compression stroke/expansion stroke Exhaust stroke

Working process schematic of WEVB

Operation procedures of WEVB ：

Auxiliary braking system WEVB is suitable for vehicles running on the long downhill path, damp and slippery roads.

How to operate:

When fully loaded vehicle is running on a long downhill path, first use the auxiliary braking system WEVB, use pedal brake if the

vehicle is faster.

I. Operation procedures of auxiliary braking system WEVB:

1. On the long downhill path, if vehicle speed is higher (eg. 5th gear, 50km/h) and engine speed doesn't approach to 2600r/min, first depress brake pedal to reduce the speed, and shift the gear selector lever to the gear which is one gear lower than the existing one to make engine speed increase to 2600r/min, then immediately depress WEVB auxiliary brake button.

2. After the WEVB control button is depressed, engine speed will be gradually reduced from 2600r/min. to 1800r/min, when vehicle speed is reduced from 40km/h to 30km/h or even lower, release WEVB brake button, after the vehicle speed is increased again, repeat the above operation procedures once again.

3.After WEVB brake button is depressed, engine speed exceeds 2600r/min. and vehicle speed exceeds 40km/h, brake pedal must be depressed until the engine speed is reduced less than 2600r/min, then depress WEVB control button again.

4. When WEVB auxiliary braking system is used, it is recommended that the engine speed should not be higher and it should remain from1800r/min to 2600r/min. and 3rd and 4th gears may be used, vehicle speed keeps less than 40km/h.

Adjustment of exhaust valve gap:

With WEVB system adopted, adjustment method for exhaust valve gap of diesel engine differs from previous method, the details for adjustment are described as below (Ser. No. of parts is shown in Fig.3):

1. The piston of cylinder to be adjusted should locate at upper dead point of compression stroke;

2. As shown in Fig. 1, under the condition that adjustment bolt assembly (Ser. No.2) is loosened, and oil seal surface of rock arm of the exhaust valve is not closely pressed, place a 0.4mm feeler gauge between the piston of exhaust valve rock arm (Ser. No. 5) and the end face of exhaust valve rod or the valve nut, and adjust the valve gap adjustment screw (Ser. No. 10) at the end of the valve tappet until total gap of the valve reaches to 0.4mm, then tighten the locknut indicated with the arrow in the said figure.

Note: During adjustment, the valve gap adjustment screw should be rotated until the feeler gauge is clamped so as to ensure that the valve rock arm piston (Ser. No. 5) is pressed to end, and there is no gap between the piston and the bottom plane of the piston fitting hole in the exhaust valve rock arm. Then,

3 As shown in Fig. 2, place a 0.25mm feeler gauge between the piston of exhaust valve rock arm (ser. No. 5) and the end face of exhaust valve rod or the valve nut, and adjust the adjustment screw assembly (Ser. No. 2) until the gap of the valve is 0.25mm, then tighten the locknut indicated

with the arrow in Fig. 2.

Note: During adjustment, the adjustment screw assembly (Ser. No. 2) should be rotated until the feeler gauge is clamped so as to ensure that the valve rock arm piston (Ser. No. 5) is pressed to end, and there is no gap between the piston and the bottom plane of the piston fitting hole in the exhaust valve rock arm.

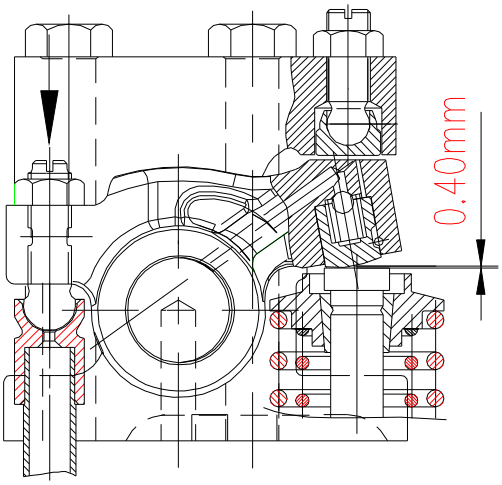


Fig. 1 Total valve gap of 0.4mm for exhaust valve in cold state

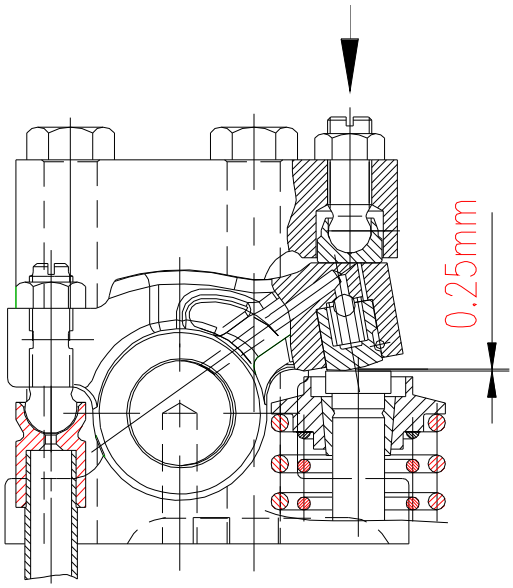


Fig. 2 Valve gap of 0.25mm at exhaust valve end in cold state

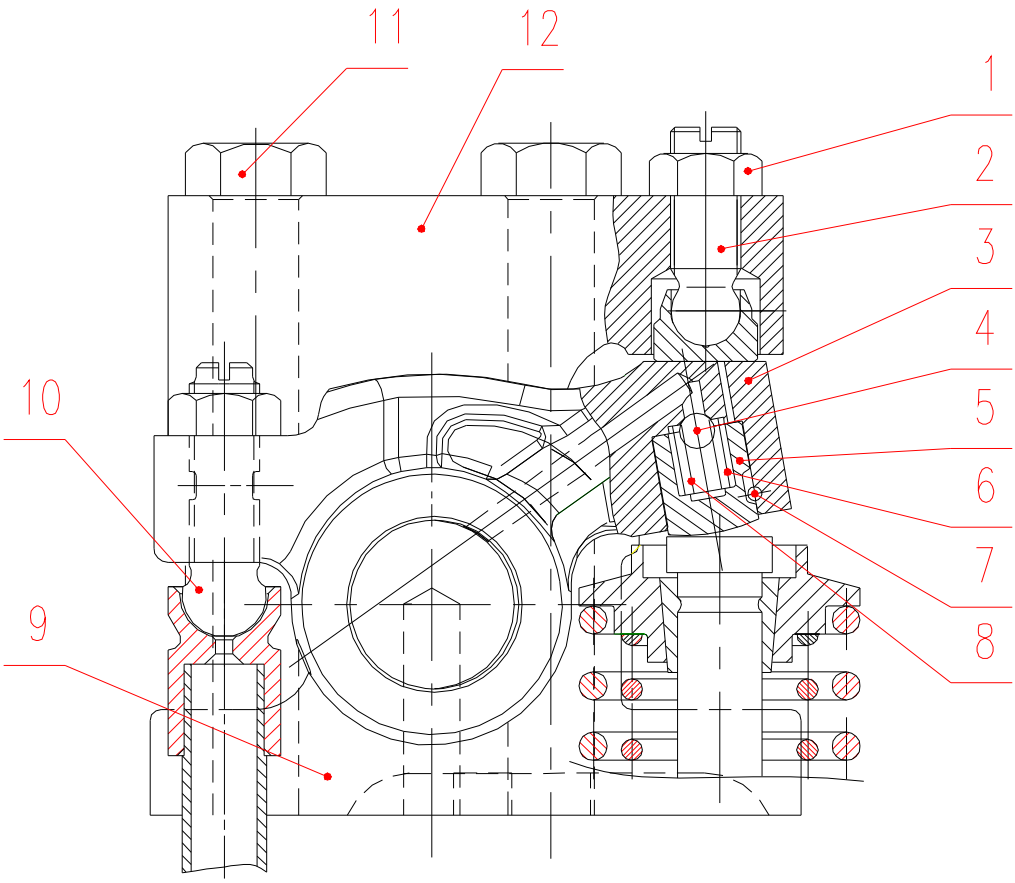


Fig.3

1.Valve gap adjustment nut　2. Adjustment bolt assembly　3. Exhaust valve rock arm assembly　4. Steel ball　5. Valve rock arm piston　6.Rock arm piston spring　7. Needle　8. Spherical valve spring　9. Valve rock arm seat assembly　10. Valve gap adjustment screw　11.Hex. head bolt　12.Support arm