VI. Description of the Injection Timing Device

a) General

The injection timing device has the task of changing the beginning of delivery in accordance with the engine speed. On the engines of the Model OM 636 without injection timing device the beginning of injection and/or delivery is adjusted to 30 to 32 deg BTDC and is constant for the entire speed range. The beginning of delivery can be moved to 26 deg BTDC by installing an injection timing device. This results in a considerable improvement as far as the noises in the low speed range are concerned. In the higher speed ranges, however, the beginning of delivery is advanced in accordance with the increasing engine speed (see Figure 07–4/18). This arrangement not only increases the engine output but saves fuel at the same time.

The course of the injection timing curve through the different speed ranges is indicated in the timing diagram below.

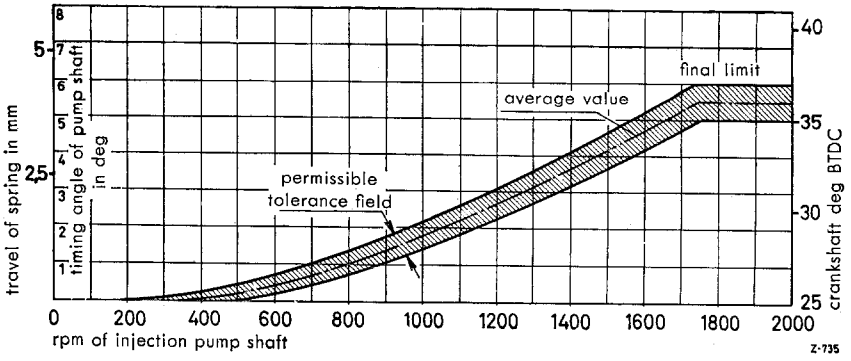

Figure 07–4/18

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b) Design and Operation

The injection timing device exploits the principle of centrifugal force. The segment plate (4) of the injection timing device is fixed to the drive gear (1) (see Figure 07–4/19). The drive gear is pivoted in the bush (7) and is not directly connected with the drive shaft (8). The segment flange (6) is securely mounted on the drive shaft (8) and guarded against turning by a Woodruff key. The two centrifugal weights (5) are located between the contact surfaces (a) of the segment plate (4) and the segment flange (6). The two tension springs (10) press the segment plate (4) and the segment flange (6) against the centrifugal weights (5) into the idling stop position.

During increasing speed the centrifugal weights (5) slide outwards due to the centrifugal force. Since the segment plate (4) is fixed to the drive gear (1), only the segment flange (6) and the attached drive shaft (8) will be shifted in the direction of rotation, thus causing the drive shaft (8) to lead the drive gear during increased speeds and the moment of injecting of the injection pump is advanced in the process.

The stop bolts (11) inside the tension springs (10) serve as a stop after reaching full load max. speed and act in addition as a safety device if a spring should break. The centrifugal weights would then fall out of the injection timing device if not guarded by these bolts. The stop bolts (11) represent in this case a direct connection between the input and output end of the injection timing device. During a decreasing speed the tension springs (10) press the centrifugal weights (5) inwards and during a constant speed they balance the centrifugal forces of the centrifugal weights.

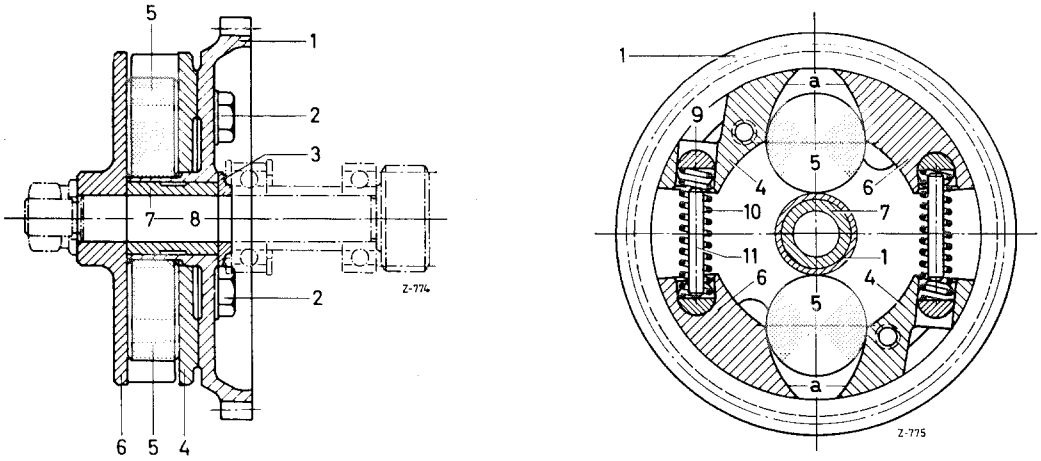

Figure 07–4/19
OM 636

1 Drive gear of injection pump
2 Fixing screws of segment plate
3 Thrust washer
4 Segment plate
5 Centrifugal weights
6 Segment flange
7 Bush for drive gear
8 Drive shaft of injection pump
9 Spring seat bolt
10 Tension spring
11 Stop bolts for the timing limit
a Contact surfaces for the centrifugal weights on the segment plate and the segment flange

VII. Injection Nozzle DNO SD 211 and DNO SD 151

The injection nozzle has the task of injecting the fuel delivered by the injection pump at a high pressure in the most favorable spray pattern and at the proper moment into the combustion chamber and distribute it in such a way, that a good combustible mixture is produced in the combustion chamber. The nozzle is controlled by the fuel pressure. During the discharge stroke of the plunger the pressure impulse is transferred through the injection lines, the pressure passage (14) in the nozzle holder, the annular groove and the inlet holes (16) of the nozzle holder insert (3), the annular groove and the pressure passages (17) in the nozzle head (2), until it reaches the pressure chamber (19) in the injection nozzle (see Figure 07–4/20). If the discharge pressure becomes stronger than the tension force of the tension spring (6), the nozzle needle is lifted off its seat and the fuel is injected through the injection hole into the pre-combustion chamber and the main combustion chamber to produce a combustible mixture there.

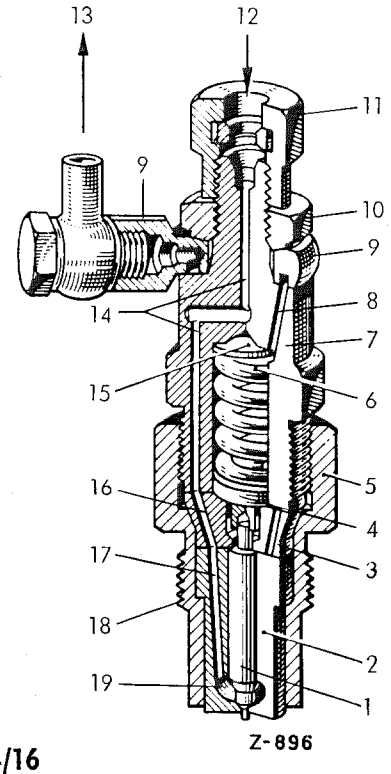

Figure 07–4/20

Nozzle Holder with Injection Nozzle DNO SD 211

1 Nozzle needle
2 Nozzle head
3 Nozzle holder insert
4 Pressure bolt
5 Cap nut to secure injection nozzle
6 Tension spring
7 Nozzle holder
8 Drip-oil passage in nozzle holder
9 Adapter with annular groove for drip-oil connector
10 Hex nut to fix adapter
11 Cap nut to fix injection line
12 Fuel inlet
13 Drip-oil outlet back to fuel tank
14 Pressure passage in nozzle holder
15 Washers of tension spring
16 Annular groove and inlet holes in nozzle holder insert
17 Annular groove and pressure passages in nozzle head
18 Mounting thread
19 Pressure chamber in nozzle head