

Wedge-shaped packing pieces

By GEOMETER

IN practical engineering, the flat wedge or inclined plane can be employed in numerous ways as a means of applying force, making fine adjustment, or varying or correcting important angles. This last is the function when wedges are used as packings between semi-elliptic road springs and front beam-type axles on cars. Then the angle controlled is the castor angle, or inclination of the king-pins, which is highly

continuation of the steering head axis strikes the ground in front of the point of contact of the wheel. The distance between the two points is the trail " and is generally 1 in. to 1 1/2in.

Without the automatic stabilising given by this geometry, steering would be very uncertain and even uncontrollable under certain conditions. On cars, this can happen when king-pins and bushes are worn, or when springs flattened with use cause a change in castor angle. Sometimes, however, a slight general deterioration with no

Points to note are that to increase castor angle, such a wedge must be fitted each side, between each spring and axle seating, thick end to the rear. The head of the spring centre-bolt must be long enough to pass through the wedge and enter the register hole in the axle. If not, the head must be deepened by welding, and it is then advisedly machined true in a lathe. U-bolts are usually long enough to accept wedges; but if locknuts cannot be refitted, then spring washers or tab-locking washers should be used with the nuts.

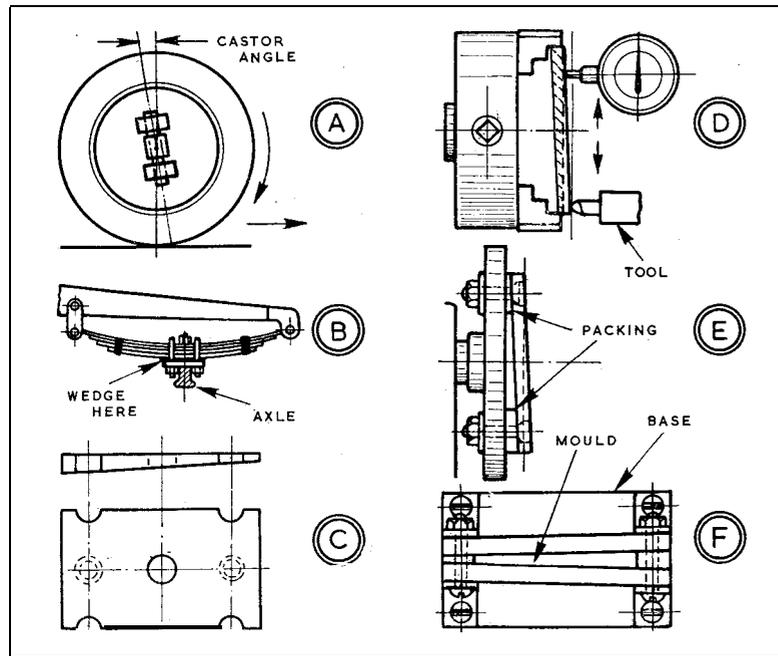
On some vehicles, the design has included wedges which are fitted thick ends to the front. When necessary, the same effect of increasing castor angle can be obtained by removing the wedges and substituting parallel plates whose thickness is the average of that of the wedges. It is a mistake to turn the wedges round, thick ends to the rear, as the castor angle is considerably increased and the steering made extremely heavy.

Common angles for wedges are 1 1/2, 2 and 2 1/2 deg. representing 0.026 in., 0.034 in. and 0.043 in. per inch length. Taking the total length of a wedge as 3 in., the difference in thickness at the ends is 5/64 in., 1/10 in., and 1/8 in. The thin end of a wedge should be about 3/32 in. thick.

Machining of wedges from parallel plate can be done on the lathe with the material held in the four-jaw independent chuck (two jaws reversed), as at **D**, or mounted on the faceplate with suitable packing strips, as at **E**. Steel may be tinned and sweated to a thicker block for holding; and attachment by screws to a hardwood block planed to angle is also able.

To cast wedges in aluminium alloy (old pistons melted in an iron ladle), a mould as at **F** can be used. Two pieces of steel plate, separated by strips, are mounted by angles on a base to form the mould. This should be deep enough to allow for settling on the top edge of a casting, should be well heated before pouring the metal, and able to be taken apart to extract the casting.

El



important if the steering is not to "wander" or dangerously "shimmy" on slight provocation.

Castor angle, as at **A**, is the angle between the axis of the king-pin and a vertical line through the wheel centre. The imaginary continuation of the kin-pin axis must strike the ground in front of the vertical line or point of contact of the wheel with the ground. Then, with forward motion, there is a natural tendency for the wheel to move stably in a straight line. On a cycle or motor-cycle the same thing applies and the

marked wear at any point can permit a change in castor angle sufficient to bring about undesirable characteristics. The remedy is to fit a wedge between each spring and axle seating, as at **B**.

A typical wedge is as at **C**, and may be in aluminium alloy or steel. It has a central hole to fit over the head of the bolt which passes through the spring leaves; and if it is wider than the leaves there are semi-circular cut-aways on the sides to clear the U-bolts holding the spring to the axle.