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(54) Title: COIL SPRING SUSPENSION

(57) Abstract: Replacement of the rubber donut suspension system on the Mini Austin by a coil spring suspension. This coil spring suspension is achieved by a coil spring telescope fitted between a bracket mounted on the front swingarm and a supporting structure welded on the inside of the front auxiliary frame tower, and a coil spring telescope mounted on the reinforced rear axle.

Coil spring suspension

Subject of innovation

Replacement of the rubber donut suspension for the Mini Austin with a coil spring. The coil spring is console mounted on the front swingarm and the front auxiliary frame. The rear coil spring is mounted on the reinforced rear axle.

Description of the suspension of the motor vehicle

The motor vehicle uses a rubber donut as both front and rear suspension.
On poor quality roads the vehicle starts to bounce, which results in imperfect roadholding, the vehicle being sensitive to any unevenness on the road.
The previous suspension system resembles in nature a hard sports (lowered) suspension.

Previous suspension solutions

In 1959 the motor vehicle was manufactured with a rubber donut suspension system. Later the British engineers developed the hydrolastic suspension which gave acceptable suspension characteristics on good road surfaces. The 1980's and 90's saw various coil spring conversions but they did not achieve wider acknowledgement The latest improvement was the development of a coil-over kit which was mounted on the brackets of the original shock absorber, using a larger mounting bracket up front, screwed on the thin body plate.
This solution eliminates the rubber donut suspension. However, because it is basically supported by the thin body plate, the coil-over system passes on the forces from holes and bumps on uneven country roads to the chassis. This is bound to eventually deform the body plate. This conversion also uses the original mounting points for the modified rear suspension module.
Based on the above, the need has emerged to develop a more comfortable, more modern and safer solution.
This is the essence of this invention. It replaces a simpler suspension system, manufactured until recent years, by a more up-to-date suspension. Here the rubber donut is totally eliminated and is replaced by a coil spring mounted on the auxiliary frame at the front and on the reinforced axle at the rear.
The coil spring telescope can be fitted between the bracket mounted on the front swingarm and the additional bracket attached to the front auxiliary frame.
When the car is unloaded, the coil spring telescope has a position of approximately 45°. This is the direction in which the coil moves. This angled mounting ensures smooth suspension.

The coil spring (Fig. 4) has the shape of a cone. The original suspension bracket has a threaded socket with a nut, enabling the height adjusment of the coil spring. Thus the front clearance (ie. the height of the nose) and the hardness of the suspension can both be adjusted.

Naturally, the coil spring telescopes work independently, according to road conditions.

Further details are explained in the description that follows. The description is accompanied by figures which show the optimal shape and functionality of the coil spring as described in this patent.

Fig. 1.

The figure shows the front view of the rubber donut suspension and the existing telescope with its mounting bracket. These are the parts which will be replaced.

Fig. 2.

Front and side views of the front auxiliary frame.

Fig. 3.

Elimination of the rubber donut suspension system, side view.

Fig. 4.

The bracket mounted on the front swingarm and the coil spring, side views.

Fig. 5.

Coil spring suspension mounted on the front auxiliary frame and the swingarm, front and side views.

Fig. 6.

Front view of the bracket mounted on the swingarm and the bracket welded on the front auxiliary frame, where the upper end of the telescope is attached.

Fig. 7.

Side and overhead view of the reinforced rear axle and of the mounting parts for the coil spring telescope.

Fig. 8.

Side view of the front and rear adjustable coil spring telescopes.

Components as seen on the figures

1. rubber donut
2. donut cone
3. supporting structure for shock absorber
4. shock absorber
5. rubber stop on auxiliary frame
6. front swingarm
7. front wheel
8. axle shaft

9. front auxiliary frame tower
10. front auxiliary frame
11. chassis
12. method of elimination

A. bracket mounted on front swingarm
B. front coil spring telescope
C. structure supporting the front coil spring telescope
D. front auxiliary frame tower (place for fitting the telescope)
E. rear axle
F. threaded socket on telescope
G. supporting structures for coil spring
H. rear coil spring telescope

The order of installation for the innovation

1. Jack and support the car.
2. First remove the engine, together with the transmission, then the further parts. Finally, remove front suspension
3. Having removed all parts from the engine compartment, lower the front auxiliary frame and modify it as follows:
   - cut out the place for the upper end of the telescope to be fitted
   - weld the unit holding the upper end of the telescope in place (Fig. 6.)
   - cut a semi-circle into the side of the front auxiliary frame tower (Fig. 5.)
   - treat the modified areas with undercarriage protective paint
4. Then, mount the front auxiliary frame back on. Fit the removed parts (engine, transmission, axle shaft, exhaust etc.), as well as the upper part of the coil spring telescope.
5. Mount and fasten the bracket supporting the lower end of the telescope on the front swingarm. Then, insert and fasten the lower end of the telescope into the bracket.
6. Finally, using the threaded socket on the telescope set ride height/ suspension hardness as desired for perfect suspension.
7. Fit the front wheels back on
8. Having converted the front suspension, we may proceed with the rear one as follows:
   - Jack up the rear of the car and remove the wheels
   - remove the telescope, the rear rubber donut and the cone
   - remove the rear axle and replace it by the reinforced axle, which will support the rear coil spring telescope

- at this point you need to expand the upper part of the chassis supporting the telescope – ie., you need to stamp it a tad, so that there is enough space for the coil spring telescope
- mount the coil spring telescope on the rear axle, fasten both ends and finally fit the wheels back on

Having completed all this you may inspect and test drive the converted Mini for suspension characteristics.

The first thing that becomes clear is that the car has an exceptionally smooth suspension with excellent ride and outstanding comfort.

Uneven road surfaces or bumps will not throw the car off the curve when cornering. This means that the tyres keep their contact with the pavement, resulting in better roadholding capabilities.

Claims of the Patent

1. The coil spring suspension for the Mini Austin has been developed with the aim to improve its suspension characteristics. The coil spring telescope is mounted on a bracket (A) on the front swingarm (6), on a supporting structure (C) welded on the inside of the front auxiliary frame (10) tower and on the reinforced rear axle (E). The suspension is achieved by the front coil spring telescope (B) fitted between the bracket (A) mounted on the front swingarm (6) and the front coil spring supporting structure (C) welded on the front auxiliary frame (10), on the the inside of the front auxiliary frame tower (D) and the rear coil spring telescope (H) fitted on the reinforced rear axle (E).
2. Coil spring suspension system, as described under Claim 1, where the front coil spring telescope (B), positioned at approximately 45°, and the rear coil spring telescope (H), positioned vertically, feature a threaded socket (F) and an adjustable supporting structure (G), which makes it possible to modify the suspension according to road or terrain conditions.

Fig. 1.

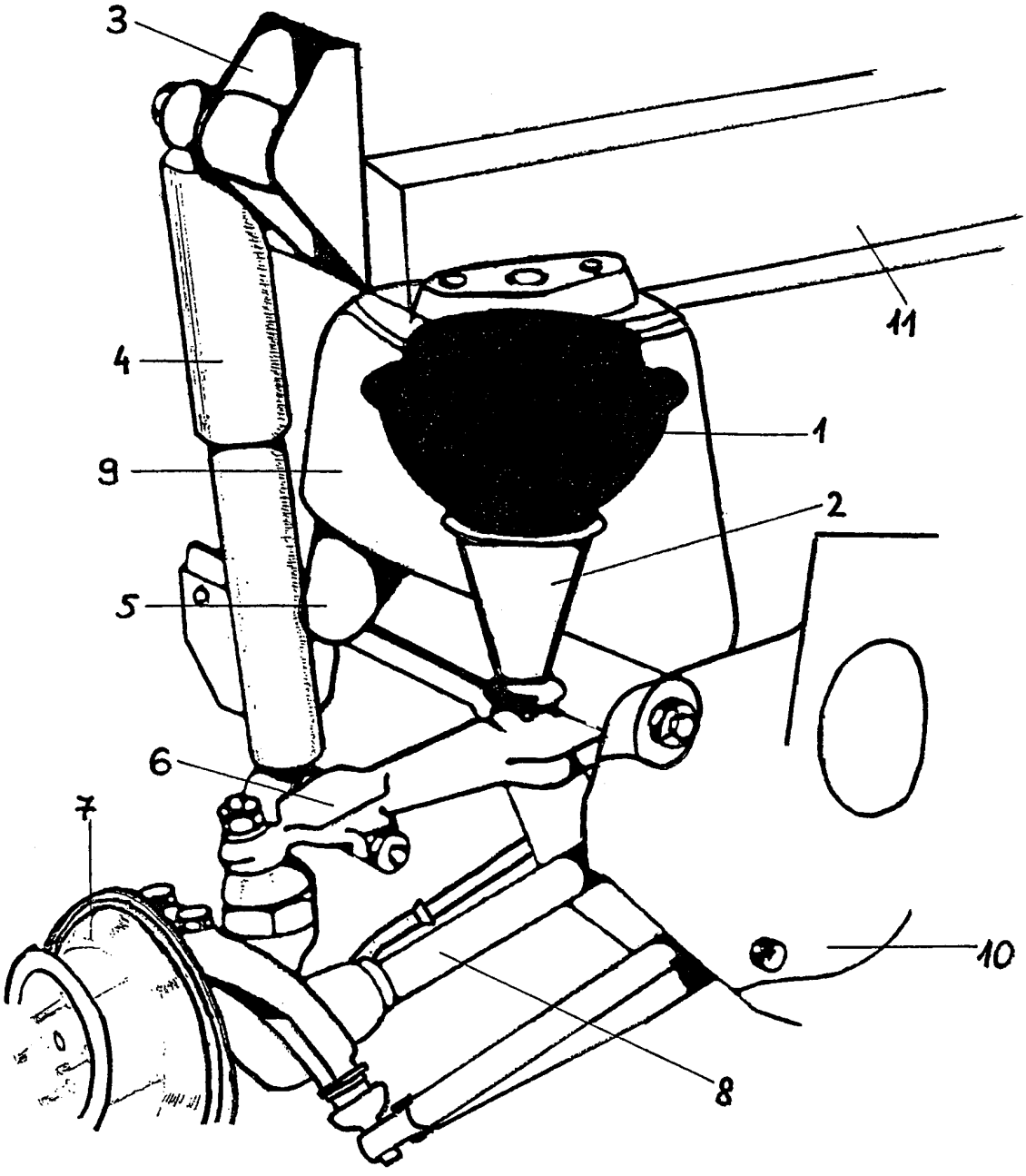
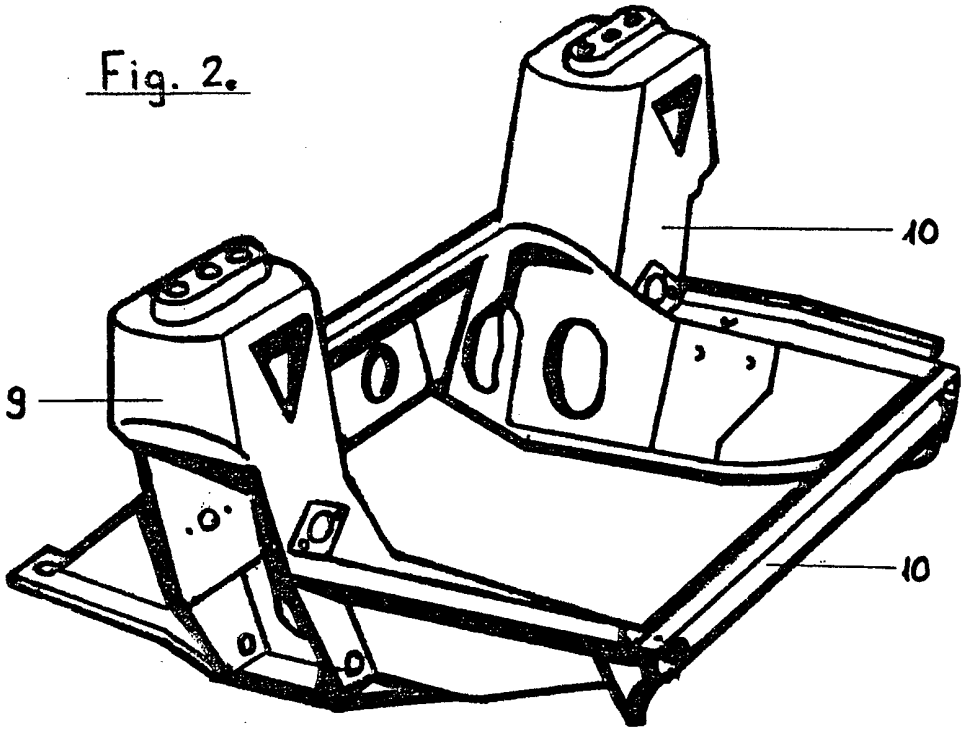


Fig. 2.



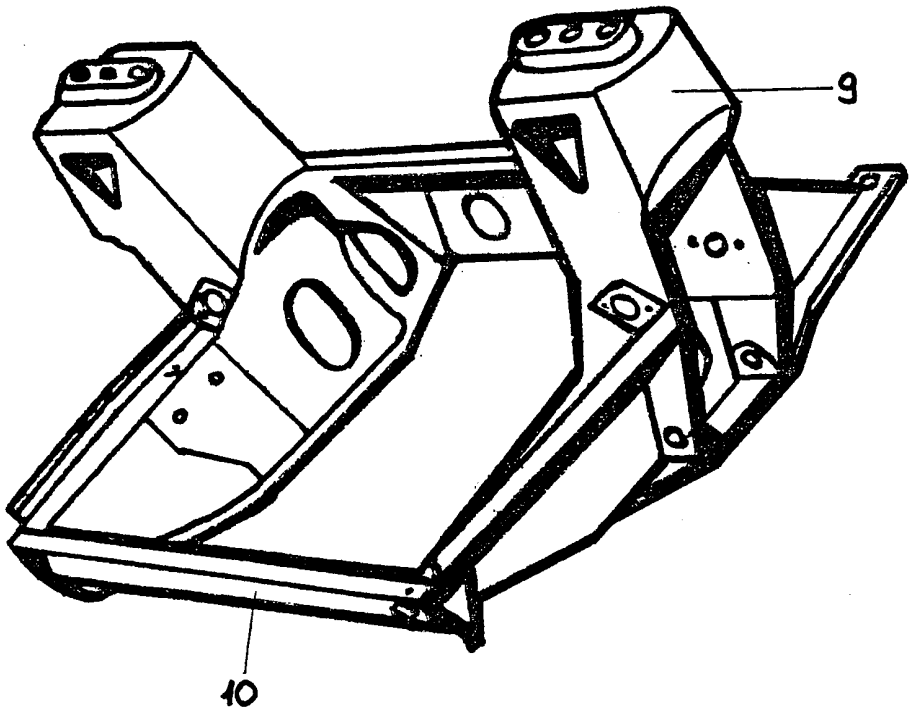


Fig. 3.

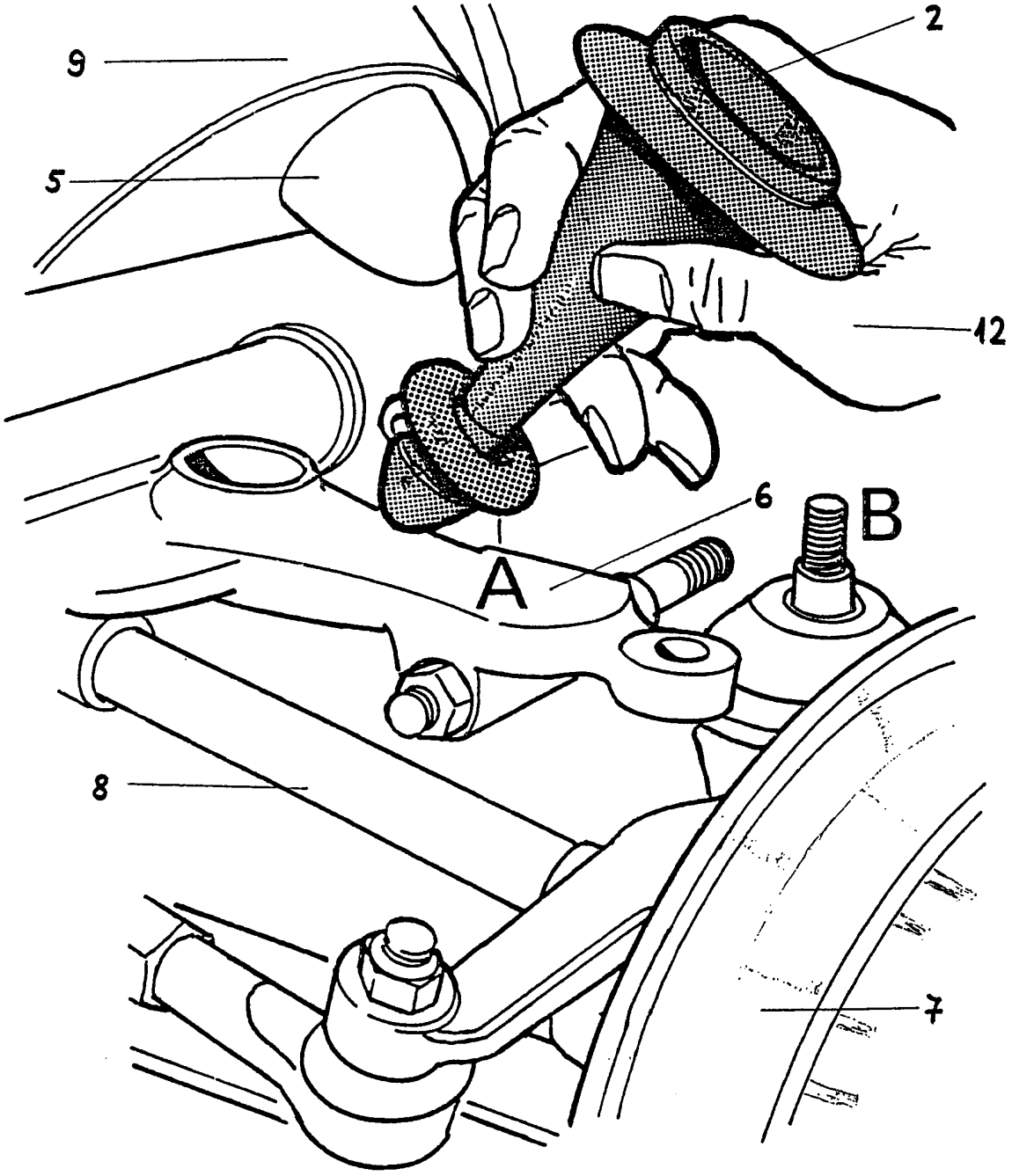


Fig. 4.

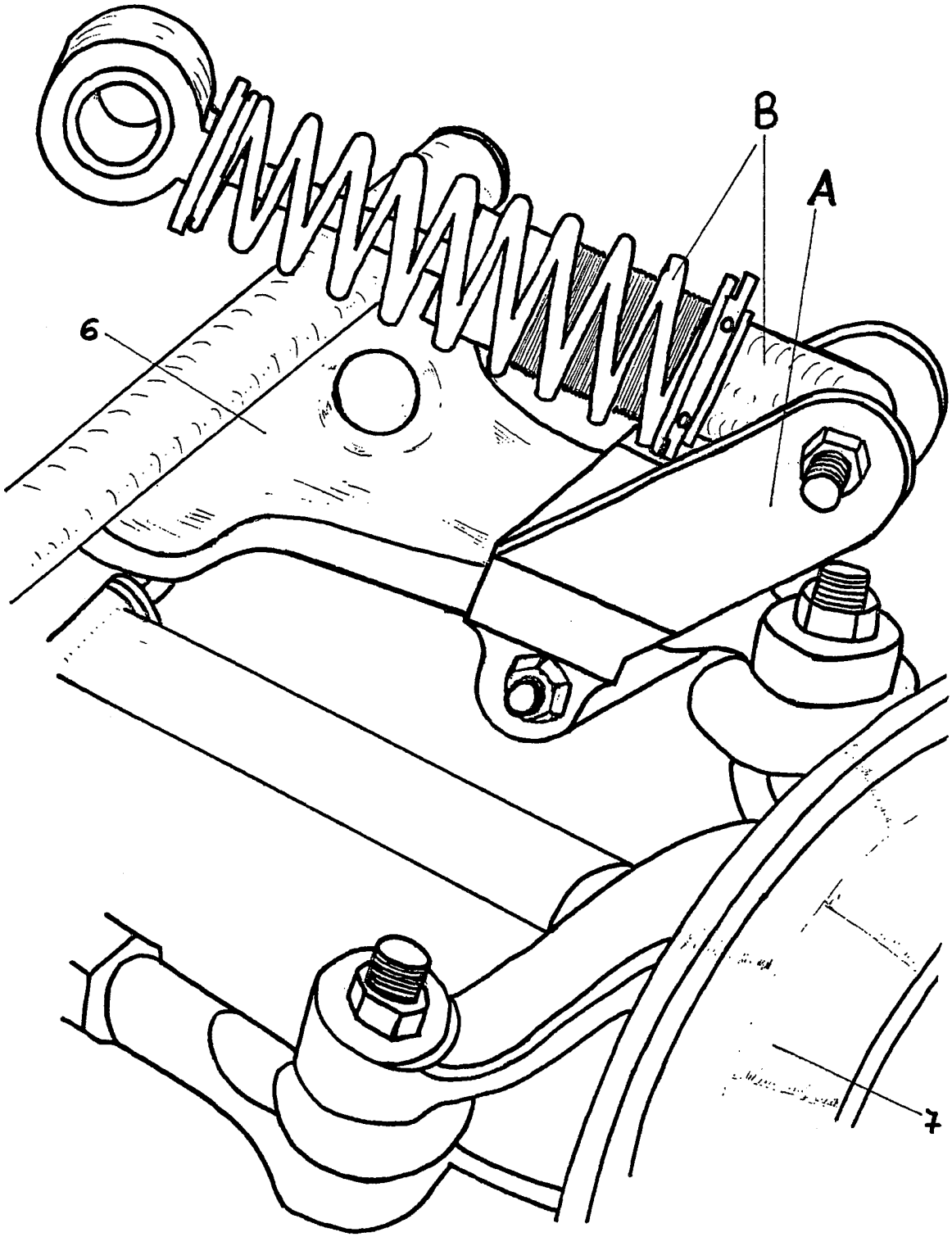


Fig. 5.

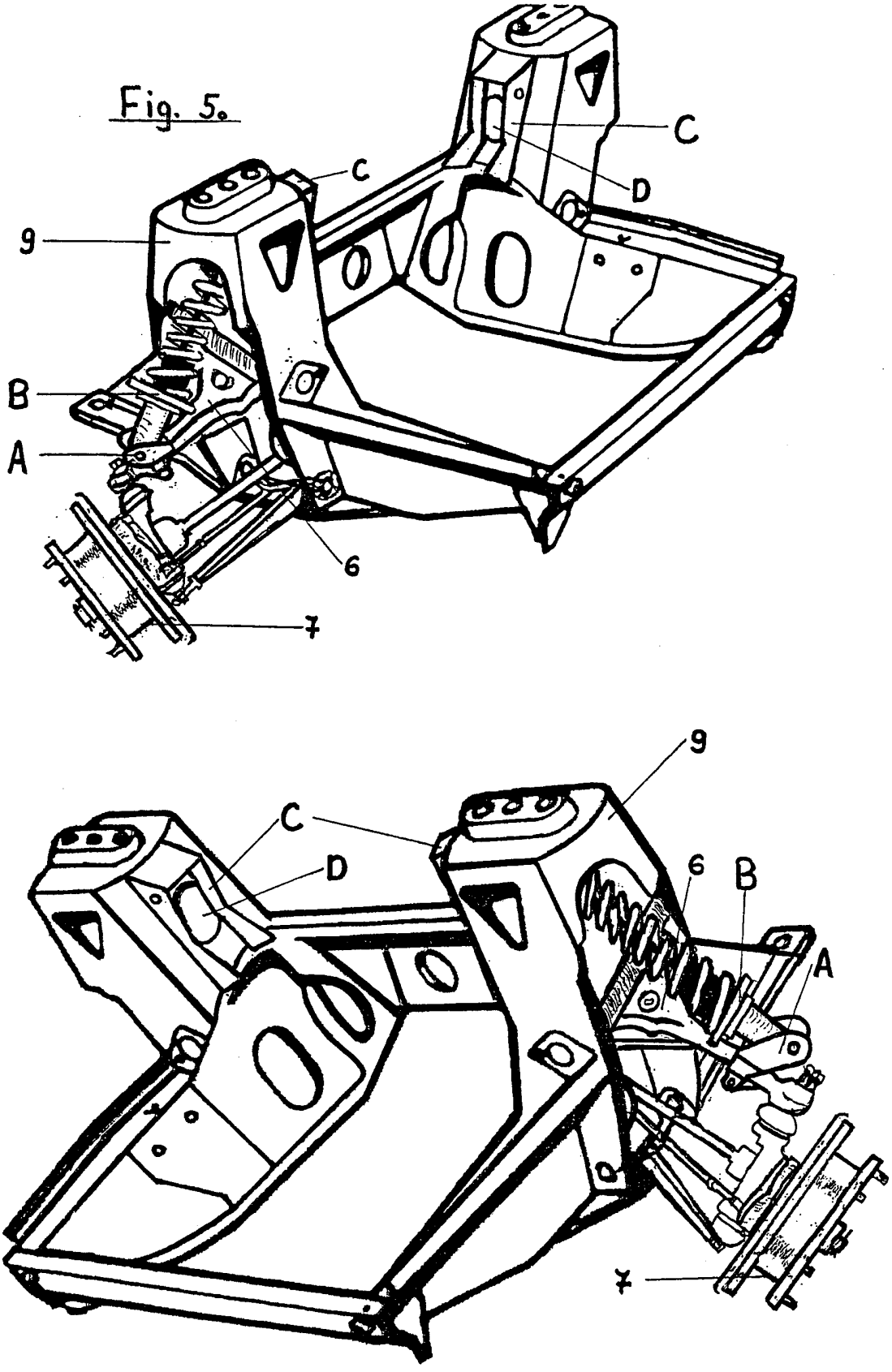
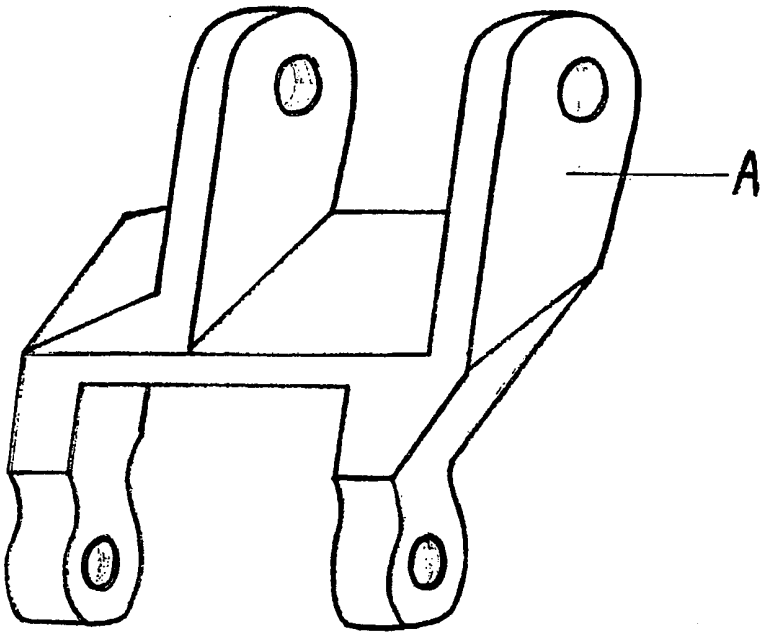


Fig. 6.



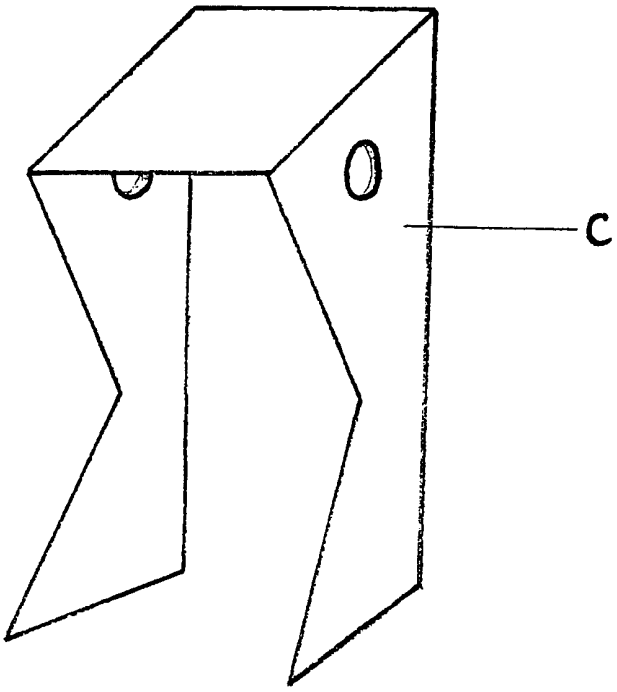
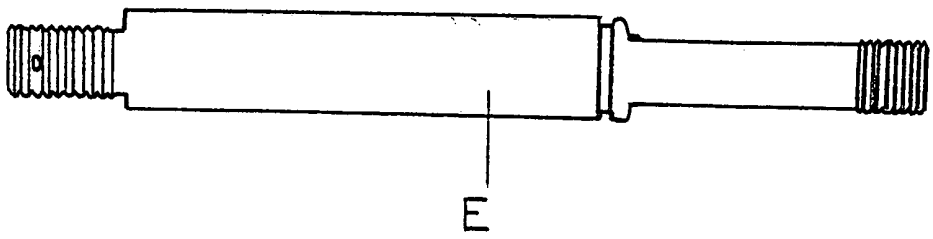


Fig. 7.



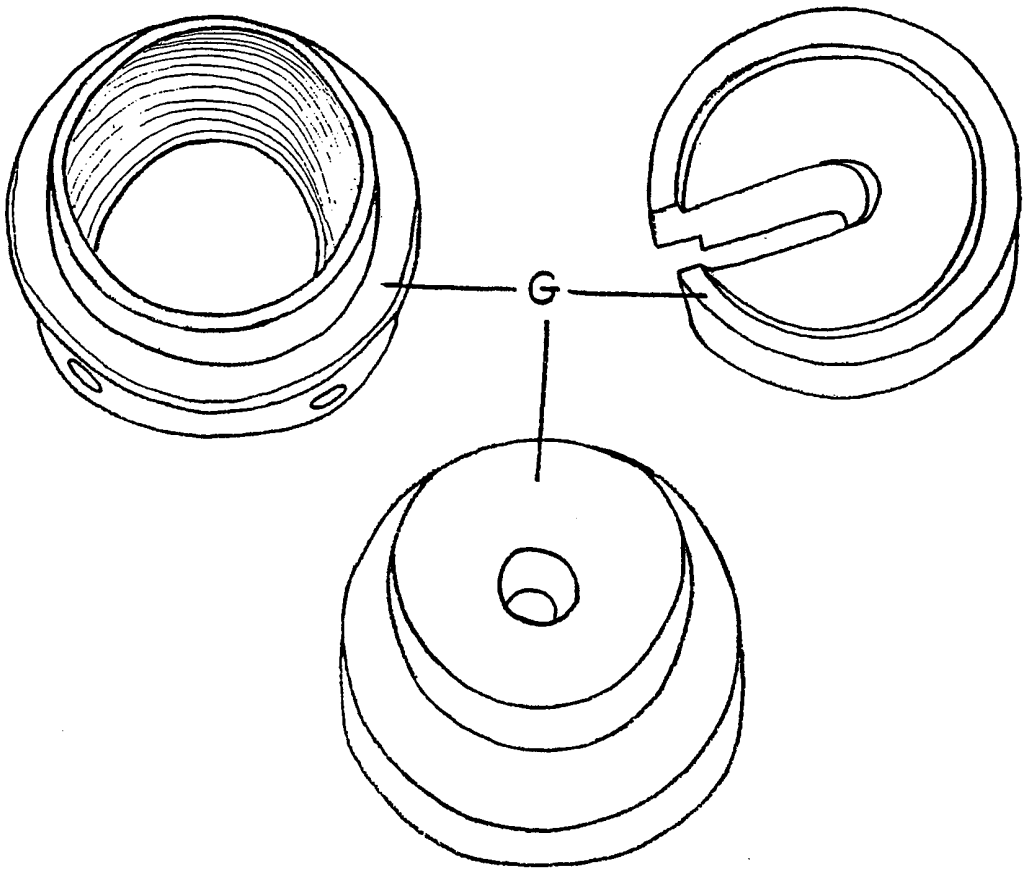


Fig. 8.