

Innovative Design of a Clutch Pedal Free Stroke Measuring Device

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Abstract

Aiming at the current problem of measuring the free stroke of the clutch pedal that is cumbersome and prone to large errors, this paper innovatively designs a simpler and more reliable clutch pedal free stroke measuring device. The structure principle is analyzed in detail in the article.

Keywords

Innovative design; The clutch pedal free stroke; Measuring device.

1. Introduction

The current method of measuring the free stroke of the clutch pedal of an automobile is to use a steel straightedge against the floor of the cab, and first measure the free height of the pedal from the floor. Then lightly press the pedal with your hand, and when you feel a large resistance, measure the height of the pedal from the bottom plate. By calculating the difference between these two heights, the free stroke can be obtained. This measurement method has many procedures and is prone to errors.

In order to overcome the shortcomings of the existing clutch pedal free travel methods, this paper innovatively designs a clutch pedal free travel measurer that is simple to operate and accurate and reliable.

2. Structure of this clutch pedal free stroke measuring device

The structure of a designed clutch pedal free stroke measuring device is shown in Figure 1. In the figure, 1. Measuring column, 2. Gauging block, 3. Steel ball, 4. Adjusting screw, 5. Large compression spring, 6. Positioning slider, 7. Mandrel, 8. Spring seat, 9. Small pressure Tight spring, 10. Wedge, 11. Guide sliding key, 12. Measuring display, 13. Anti-drop nut.

It can be seen from Figure 1 that the clutch pedal free stroke measurement device includes a measuring column, a gauge block, a steel ball, an adjusting screw, a large compression spring, a positioning slider, an ejector rod, a spring seat, a small compression spring, a wedge, and a guide Feather key, measuring display and anti-drop nut. The upper end of the gauge block is provided with a transverse measuring fork arm, and the upper end of the positioning slider is provided with a transverse pressing arm. The position of the transverse pressing arm is higher than the transverse measuring fork arm. The gauge block is sleeved on the measuring column and slidingly matched with it. The positioning sliding block is sleeved on the measuring block and slidably fitted with it, and a horizontal through hole is arranged on the horizontal through hole, and the ejector rod, the steel ball, the large compression spring and the adjusting screw are sequentially arranged in the horizontal through hole. The guide sliding key is installed between the measuring block and the positioning sliding block. The measuring block is provided with a circular arc pit adapted to the steel ball, and a small part of the steel ball is inserted into the pit. The wedge angle of the wedge is smaller than the friction angle between the wedge and the measuring column. The side wall of the inner hole of the gauge block is provided with a cavity matching the shape of the wedge block, and the cavity is communicated with the transverse through hole. The wedge is installed in the cavity and is in contact with the measuring column, the spring seat is installed at the bottom of the measuring block, and the

small compression spring is installed between the spring seat and the wedge. The measuring display is fixed on the positioning sliding block, and the anti-dropping nut is connected to the upper end of the measuring column with a thread.

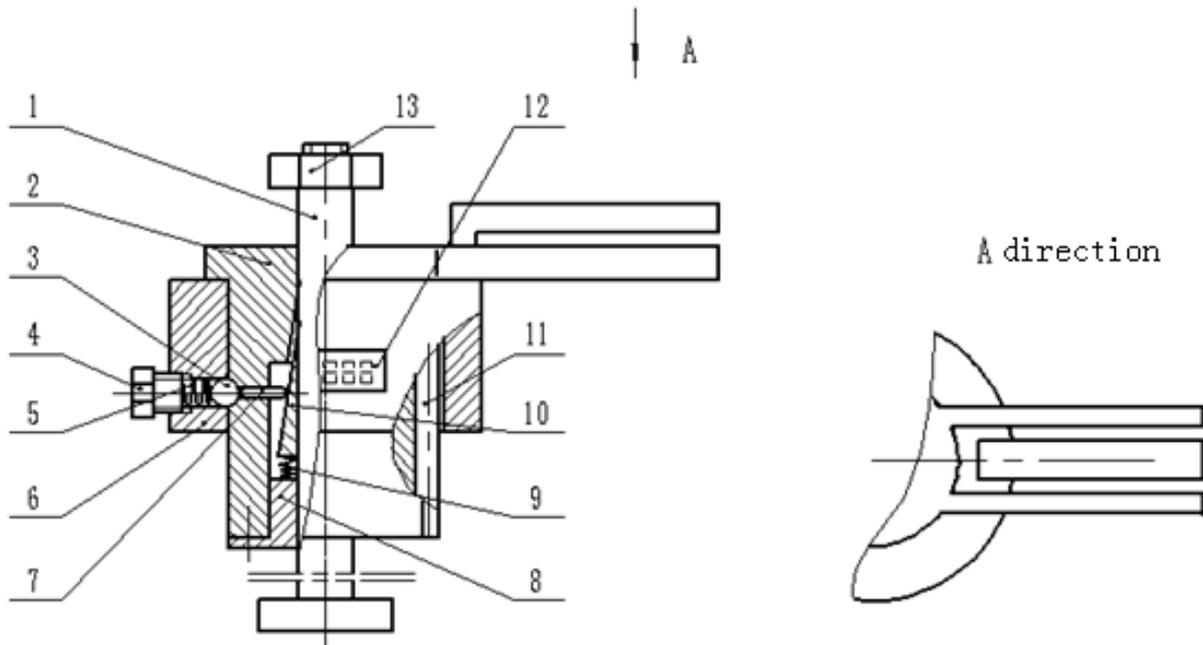


Figure 1. The structure of the new clutch pedal free stroke measuring device

3. Analysis of the working process of the measuring device

First, put the measuring column against the floor of the cab, hold the positioning slider to move it downward. Because the steel ball in the transverse through hole of the positioning slider is pressed into the recess of the gauge block by the large compression spring, the gauge block will move down with the positioning slider at this time. When the lateral measuring fork arm at the upper end of the gauge block contacts the clutch pedal, the gauge block remains stationary due to the resistance of the clutch pedal, and the steel ball will overcome the elastic force of the large compression spring and begin to retreat, and the small compression spring also starts to push the wedge upward. It can be seen that in order to achieve the above action, it is necessary to determine the diameter of the steel ball, the depth of the dent of the gauge block, the size of the wedge angle, the parameters of the large compression spring and the small compression spring according to the resistance of the clutch pedal at this time, so that the clutch pedal The resistance is greater than the downward thrust of the gauge block. Before the lateral pressing arm of the positioning slider contacts the clutch pedal, the steel ball is fully retracted, and the wedge is also fully wedged between the measuring block and the measuring column. Since the wedging angle of the wedge is smaller than the friction angle between the wedge and the measuring column, the gauge block remains stationary during the subsequent measurement process. Continue to move the positioning slider down until it stops when a large resistance appears. At this time, the value measured and displayed by the measurement display is the relative displacement of the positioning slider and the gauge block during the whole process, that is, the free stroke of the clutch pedal.

The measured value is the entire movement of the positioning slider relative to the gauge block. That is, the positioning slider has a relative movement amount from the beginning of the movement of the relative gauge block until the clutch pedal appears large resistance. From a structural point of view, when the transverse measuring fork arm at the upper end of the gauge block contacts the clutch pedal, until the steel ball completes a certain retreat, the positioning slider begins to move relative to the

gauge block. The positioning slider and the gauge block have a movement amount, and the movement is The movement that occurs cannot be directly measured. Therefore, in order to ensure the measurement accuracy, the key of this design is to eliminate the influence of the process from when the lateral measuring fork arm on the upper end of the gauge block contacts the clutch pedal to when the positioning slider starts to move relative to the gauge block. The easiest way is to add a quantitative compensation value so that the value measured and displayed by the measurement display is the result value considering the compensation amount.

4. Conclusion

It can be seen from the above analysis that the innovatively designed clutch pedal free stroke measurement device does not need to perform two measurements and difference calculations, and eliminates the lateral measurement fork arm at the upper end of the gauge block from contacting the clutch pedal to the start of positioning the slider Produces the influence of the movement of the relative gauge block, so the operation is simple, the measurement is accurate and reliable, and the efficiency is high. It has the value of promotion in the auto repair industry.

References

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