

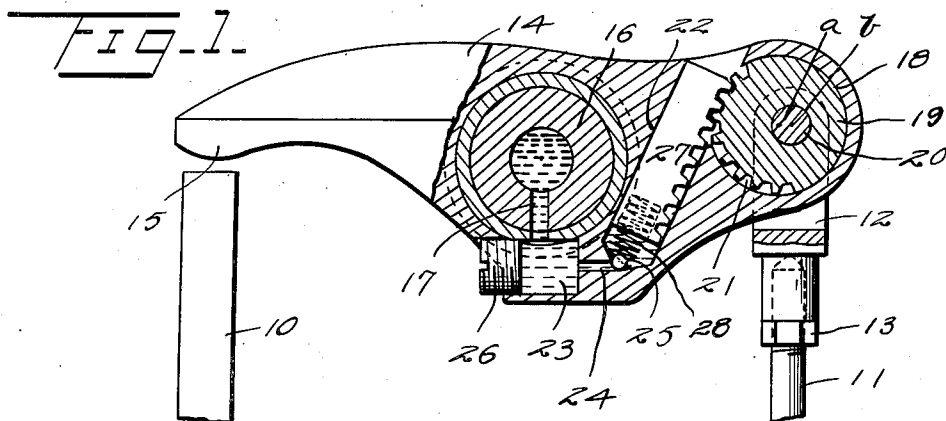
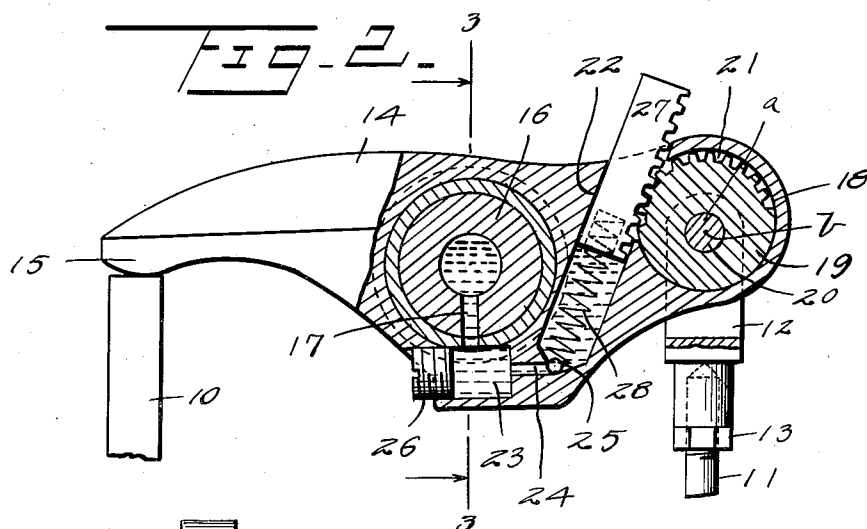
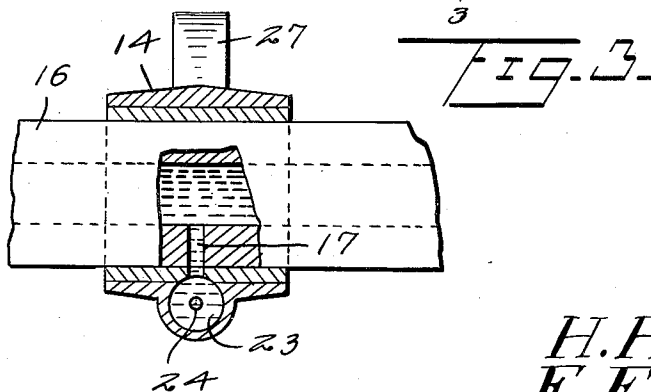
July 24, 1934.

H. H. WELLS ET AL

1,967,918

AUTOMATIC TAKE-UP FOR ROCKER ARMS

Filed March 5, 1932



Inventor
H. H. Wells
E. E. Brown
By *Watson & Coleman*
Attorney

UNITED STATES PATENT OFFICE

1,967,918

AUTOMATIC TAKE-UP FOR ROCKER ARMS

Harry H. Wells and Edward E. Brown, Ferndale,
Mich.

Application March 5, 1932, Serial No. 597,020

2 Claims. (Cl. 123--90)

This invention relates to the valves of internal combustion engines and particularly to means for operating the rocker arm of a valve-in-the-head motor.

5 The general object of the present invention is to provide means for automatically shifting the rocker arm with relation to the operating cam and to the valve stem so that at all times any gap between the end of the rocker arm and the valve stem may be automatically kept closed to thus hold the extremity of the rocker arm or tappet in close engagement at all times with the valve stem and to eliminate the noise caused by the impact of the rocker arm against the valve stem.

A further object is to provide a construction of this character wherein the fluid pressure acts to secure this take-up action.

Other objects will appear in the course of the following description.

Our invention is illustrated in the accompanying drawing, wherein:—

Figure 1 is a side elevation partly in section of a rocker arm, a valve stem and the cam rod for operating the arm, the parts being shown in a position wherein the extremity of the tappet or arm is spaced from the valve stem;

Figure 2 is a like view to Figure 1 but showing the operation of the take-up means and showing the gap between the valve stem and the tappet arm closed;

Figure 3 is a section on the line 3—3 of Figure 2.

Referring to these figures, 10 designates a valve stem of an internal combustion engine. This valve stem is shown diagrammatically as the particular character of the valve stem has no immediate bearing on the present invention. 11 designates the usual cam rod by which the usual rocker arm is oscillated, this cam rod being actuated by a cam not shown and at its upper end being provided with a fork 12 designed to be connected to the rocker arm and with a nut 13 whereby this adjustment may be made. So far all of the parts which we have described are old and well-known. The rocker arm 14 may be of any suitable type and at one end is formed on its under face with the rounded boss 15 adapted to engage with the extremity of the stem. This rocker arm is oscillatably mounted upon an oil pipe 16 having an outlet port 17. The oil pipe is connected to any suitable source of fluid under pressure and it is to be understood that there are as many rocker arms mounted upon the oil pipe as desired.

In order to automatically and yieldingly hold the end of the rocker arm at all times against the valve stem and take up any gap between the upper end of the valve stem and the boss of the rocker arm, we form in cam rod engaging end of the rocker arm the bearing 18 and dispose within this bearing the eccentric 19. This eccentric is rotatably mounted on a pin 20 which extends into the forks of the clevis 12. In the drawing *a* designates the center of the bearing 16 and *b* the axis of the eccentric in the center of pin 18. The eccentric is formed upon a portion of its periphery with the gear teeth 21, these teeth extending radially with reference to the center of the eccentric. The bearing 18 opens into a downwardly and forwardly inclined chamber 22. Formed in the rocker arm immediately beneath the port 17 is a second chamber 23 into which the port 17 opens, this second chamber being connected to the bottom of the chamber 22 by means of the passage 24. A valve seat is formed at the lower end of the chamber 22 and a ball valve 25 is disposed on this valve seat. Any check valve may be used for this purpose, the purpose being to allow the entrance of liquid into the lower end of the chamber 22 to prevent the rearward movement of the liquid. The outer end of the chamber 23 is closed by a plug 26 and disposed within the chamber 22 is a movable rack 27 having teeth which engage with the gear teeth 21.

For the purpose of shifting the rack 27 outward, we disposed within the chamber 22 the coiled compression spring 28 which does not bear against the check valve but surrounds the check valve and bears against the end of the chamber exteriorly of the check valve. This spring 28 at its outer end is disposed within the recess in the inner extremity of the rack 27 and urges this rack outward. This spring in addition to the weight of the rod 11 acts to urge the piston or rack 27 outward and the oil in the chamber prevents a return movement of the rack 27.

The operation of this mechanism is as follows:—In Figure 1, the cam rod 11 is about to move downward on its initial stroke. The centers *a* and *b* of the eccentric bearing and of the pin 20 are in an approximately horizontal plane with relation to each other. As the push rod moves downward, the pin 20, which is free to rotate and the eccentric mounted thereon will move to the position shown in Figure 2 with the center *b* of the pin disposed below the center *a* of the eccentric. The eccentric, in other words, will rotate from the position shown in Figure 1 to that shown in Figure 2. This rotation of the

eccentric will be secured by the outward pressure of the spring 28 as heretofore stated. As soon as the rack 27 has moved outward, the oil will flow into the chamber 22 and will be trapped in there by the check valve 25.

As the cam rod 11 moves downward, therefore, the pressure behind the rack 27 will cause it to move outward toward the position shown in Figure 2 and this will rotate the eccentric so as to lift the eccentric end of the rocker arm 14 and depress the toe of the rocker arm to bring it in contact with the valve stem 10. Thus as the cam rod descends, the left hand end of the rocker arm, as shown in Figure 1, will also move downward and the small gap between the boss on the left hand end of the rocker arm and the valve stem will be closed. Thus when the cam rod has fully descended, the opposite end of the rocker arm will still bear against, though it will not depress, the valve stem 10. When the cam rod 11 rises, however, the oil which has been trapped by the check valve within the chamber 22 will prevent any reverse movement of the rack 27 and, therefore, the upward movement of the cam rod 11 will depress the toe of the rocker arm and depress the valve stem.

It is to be understood, of course, that if at any time there is a gap formed between the toe of the rocker arm and the valve stem, the pressure behind the rack will cause the further outward movement of the piston-like rack 27 which will turn the eccentric still more, thus taking up the gap. Thus the rack will at all times be urged upward and any wear will be constantly taken up and the rocker arm held in contact with the valve stem 10, thus eliminating any noise due to an impact between the right hand end of the rocker arm and the valve stem and taking up all play between these parts.

Of course, it will be understood that the valve stem 10 is urged upward by the usual spring which holds the valve to its seat and the pressure within the oil pipe 16 is not sufficient to cause any depression of this valve stem 10 against the action of the spring. It is only when a gap is formed between the toe of the rocker arm and the valve stem that the liquid under pressure acts to force the rack outward.

While we have heretofore referred to this device as being particularly adapted for use in connection with the tappets or rocker arms of internal combustion engines, we do not wish to be limited to this as the invention might be used on any power driven mechanism where a rocker arm or tappet is necessary and where a take-up between the rocker arm and tappet rod is required.

Such mechanism is often used in pumps and steam engines.

While we have illustrated certain details of construction and arrangements of parts, it will be understood that many minor changes might be made in the details without departing from the spirit of the invention as defined in the appended claims.

We claim:—

1. In a structure of the character described, a stem, an oscillatable rocker arm coacting therewith, an oil feed pipe having oil therein under pressure and on which the rocker arm is mounted for oscillation, one end of said arm approximating the stem, the opposite end of the arm having a bearing, an eccentric disposed in the bearing and having gear teeth, a push rod having a pin upon which the eccentric is mounted for rotation, the eccentric having its axis displaced radially relative to the axis of the bearing, the rocker arm being formed to provide a chamber intersecting said bearing, a rack disposed in said chamber and constituting a piston, the rack engaging the teeth on the eccentric, said chamber at its inner end having communication with the oil feed pipe, a check valve in the inner end of the chamber permitting the inflow of liquid into the chamber but preventing the outflow thereof, and a spring urging the rack outward.
2. In an engine, a valve, a valve stem, an oscillating rocker arm coacting therewith, an oil feed pipe on which the arm is mounted for oscillation, one end of the arm approximating the valve stem, the opposite end of the arm having a square bearing, an eccentric disposed in said bearing and having teeth on its periphery, a cam rod having a pin upon which the eccentric is mounted for rotation, the axis of the eccentric being displaced radially relative to the axis of the bearing, the rocker arm being formed to provide a chamber intersecting said bearing, a piston-like member disposed in the chamber and having rack teeth engaging with the teeth on the eccentric, the rocker arm being formed to provide a sump communicating with the interior of the oil pipe, the sump communicating with the inner end of the chamber, a check valve disposed at the inner end of the chamber and permitting the flow of liquid from the sump into the chamber but preventing the reverse flow thereof, and a spring disposed within the inner end of the chamber and bearing against the inner end of the piston-like member and urging it outward.

HARRY H. WELLS.
EDWARD E. BROWN.