Oct. 26, 1937. J. LAESSKER 2,096,814

INTERNAL COMBUSTION ENGINE

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Fig. 1.

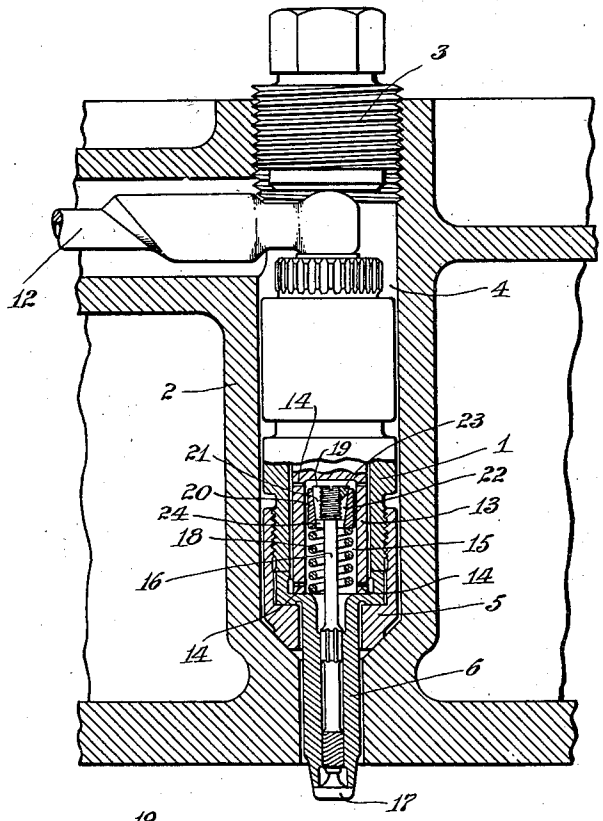


Fig. 2.

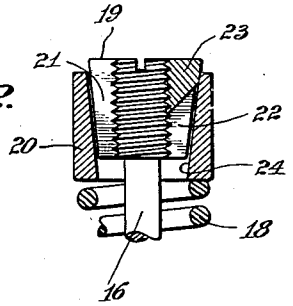
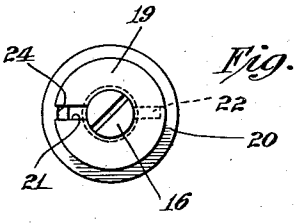


Fig. 3.



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INTERNAL COMBUSTION ENGINE

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3 Claims. (Cl. 299—107.6)

The closing motion of the valve stem or of an injection nozzle for internal combustion engines is as a rule effected by a spring, the end of which, acting on the valve stem, bears against an abutment sleeve which is threaded on the valve stem. This is the case more particularly in so-called disc or plate nozzles, in which a disc at the end of the nozzle needle or valve stem closes the outlet opening for the fuel.

In each closing operation the valve disc, under the influence of the closing spring, strikes against the end of the nozzle body surrounding the fuel outlet opening. The stress due to impact thus caused is transmitted by the nozzle needle or valve stem to the thread by which the abutment sleeve is fixed on the upper end of the valve stem. Under the influence of these continuously repeated impacts the thread of the abutment sleeve or of the valve stem becomes loose, more particularly since the thread convolutions on the abutment sleeve and the valve stem bear against one another on one side only, owing to the action of the very powerful closing spring. This disadvantage is particularly noticeable when the valve plate or disc and the nozzle or valve stem are of small dimensions which must be adhered to if these parts are accommodated in the interior of a filter body inserted in the nozzle body. When the mutual engagement of the threads provided on the one hand on the abutment sleeve and on the other hand on the needle or valve stem become even only slightly loosened, the threads will very rapidly strip, so that a satisfactory operation of the needle or valve stem or of the entire injection nozzle is no longer to be relied on.

By the present invention this disadvantage is overcome by making the abutment sleeve substantially of two coacting parts, of which one part which carries the internal thread which coacts with the thread of the valve stem, is resiliently compressible in a direction transverse to the longitudinal axis of the valve stem, tapers conically in a direction opposite to the direction of pressure of the closing spring, and lies in a corresponding hollow conical recess of the other part of the abutment sleeve, against which the closing spring bears. By this construction the stripping of the thread convolutions referred to above is with certainty avoided, for through the wedging action of the coacting conical surfaces of the two parts of the sleeve and through the force of the closing spring the resiliently compressible part of the sleeve is pressed with its internal thread so firmly against the thread of the valve stem that the two threads, external and internal, always bear firmly against one another. Stripping of the thread is thus definitely prevented.

The invention will be more fully described hereinafter with reference to the accompanying drawing, in which is illustrated a constructional example and in which:

Figure 1 shows the improved injection nozzle partly in longitudinal section, while in

Figures 2 and 3 the spring abutment sleeve is shown in longitudinal section and in plan view on a larger scale.

The nozzle body 1 is disposed in a chamber 4, which is provided in the cylinder head 2 of the internal combustion engine, and is closed at its upper end by a screw plug 3, the nozzle body being connected by an internally threaded and shouldered sleeve 5 in a fluid-tight manner with the nozzle head 6. The lower end of the nozzle head 6 extends as usual somewhat into the cylinder space of the internal combustion engine. The fuel is supplied through a pipe 12 which is in communication with the upper end of the nozzle body.

The nozzle body 1 has a longitudinal bore in which a filter body 13 is disposed. This filter body is formed in known manner with external longitudinal grooves, through which the fuel passes during the filtering process. The filtered fuel then passes through fine openings 14 provided in the lower part of the filter body into a cavity 15 within the filter body, into which extends the upper end of the stem 16 of the nozzle plate or valve disc 17, the valve stem being as usual movable longitudinally in the nozzle head 6. This valve disc 17 normally closes the outlet opening for the fuel provided at lower end of the nozzle head 6.

The valve disc 17 is held in the closed position by a spring 18 which is disposed in the cavity 15 in the filter body and bears at one end against the nozzle head 6 and at the other end against a spring abutment sleeve fixed to the upper end of the stem 16. When the pressure of the fuel passing through the filter 13 rises and overcomes the closing force of the spring 18, the plate 17 is moved from its seat and the fuel passes through the annular outlet thus formed into the combustion space in the form of a fine spray. The sleeve is made up of two parts, consisting on the one hand of a part 19 adapted to be threaded on the upper end of the stem 16 and on the other hand of a sleeve-like part 20 which coacts with the said threaded part.

As shown more particularly in Fig. 2, the threaded part 19 is provided with two slots 21 and

22 which extend in the longitudinal direction of the stem 16 and of which the slot 21 extends over the entire height of the threaded part, whereas the slot 22 extends over only a portion of the entire height, so that a bridge 23 is formed, which interconnects the two halves of the threaded part 19, which are formed by the slots 21 and 22. Owing to the provision of the two slots 21 and 22, the threaded part can be resiliently compressed transversely to the longitudinal axis of the stem 16. The part 19 of the sleeve is conically tapered externally in opposition to the direction of pressure of the closing spring 18 and lies in a corresponding internally conical bore 24 of the second sleeve-like part 20 of the abutment, against the lower edge of which the upper end of the closing spring 18 bears. Under the action of the closing spring the outer sleeve-like part 20 of the abutment is forced upwards, with the result that the resilient threaded part 19 is pressed with its internal thread firmly against the external thread provided at the upper end of the stem 16. By this means and owing to the wedging action of the coacting conical surfaces of the two parts 19 and 20 of the abutment the two of the threaded surfaces provided on the one hand in the part 19 of the spring plate and on the other hand on the upper end of the stem 16 are caused always to bear firmly against one another. Any stripping of these threads under the influence of the impacts which are continuously repeated at each closing motion is thereby prevented with certainty. It will be observed that the part 20 is movable longitudinally to a limited degree with respect to the part 19 under the influence of the spring 18 and that by reason of such movement and the coacting conical surfaces of the two parts, the part 19, being resilient, is compressed about the stem 16 and its internal thread is pressed firmly against the external thread at the upper end of the stem 16.

I claim as my invention:

1. In an injection nozzle for internal combustion engines, the combination of a nozzle, a nozzle head, a threaded valve stem movable longitudinally, a valve carried by the valve stem and arranged to cooperate with the nozzle head, a spring abutment sleeve consisting of two coacting parts, of which one part is threaded internally for engagement with the valve stem, is resiliently compressible in a direction transverse to the longitudinal axis of the valve stem, and is conically tapered externally toward the valve, and the other part of which is movable longitudinally with respect to the first named part and is conically tapered internally to cooperate with the first named part, and a closing spring which bears against the second named part.

2. In an injection nozzle for internal combustion engines, the combination of a nozzle, a nozzle head, a threaded valve stem movable longitudinally, a valve carried by the valve stem and arranged to cooperate with the nozzle head, a spring abutment sleeve consisting of two coacting parts, of which one part is threaded internally for engagement with the valve stem, and is slotted longitudinally and is thereby resiliently compressible in a direction transverse to the longitudinal axis of the valve stem, and is conically tapered externally toward the valve, and the other part of which is movable longitudinally with respect to the first named part and is conically tapered internally to cooperate with the first named part, and a closing spring which bears against the second named part.

3. In an injection nozzle for internal combustion engines, the combination of a nozzle, a nozzle head, a threaded valve stem movable longitudinally, a valve carried by the valve stem and arranged to cooperate with the nozzle head, a spring abutment sleeve consisting of two coacting parts, of which one part is threaded internally for engagement with the valve stem, and is itself formed of a plurality of parts divided longitudinally and connected at one point by a bridge piece, and is thereby resiliently compressible in a direction transverse to the longitudinal axis of the valve stem, and is conically tapered externally toward the valve, and the other part of which is movable longitudinally with respect to the first named part and is conically tapered internally to cooperate with the first named part, and a closing spring which bears against the second named part.

JEAN LAESSKER.