A. TACCHELLA.

ENGINE INJECTION VALVE.

APPLICATION FILED OCT. 5, 1917.

1,396,978. Patented Nov. 15, 1921.

Fig. 1.

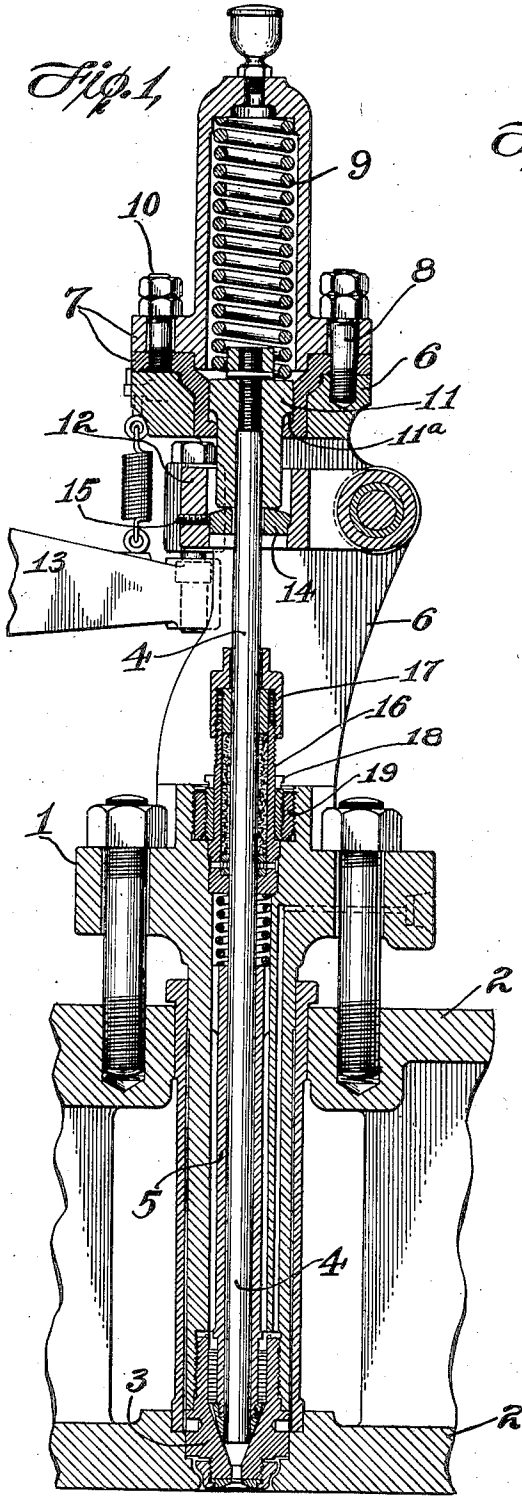
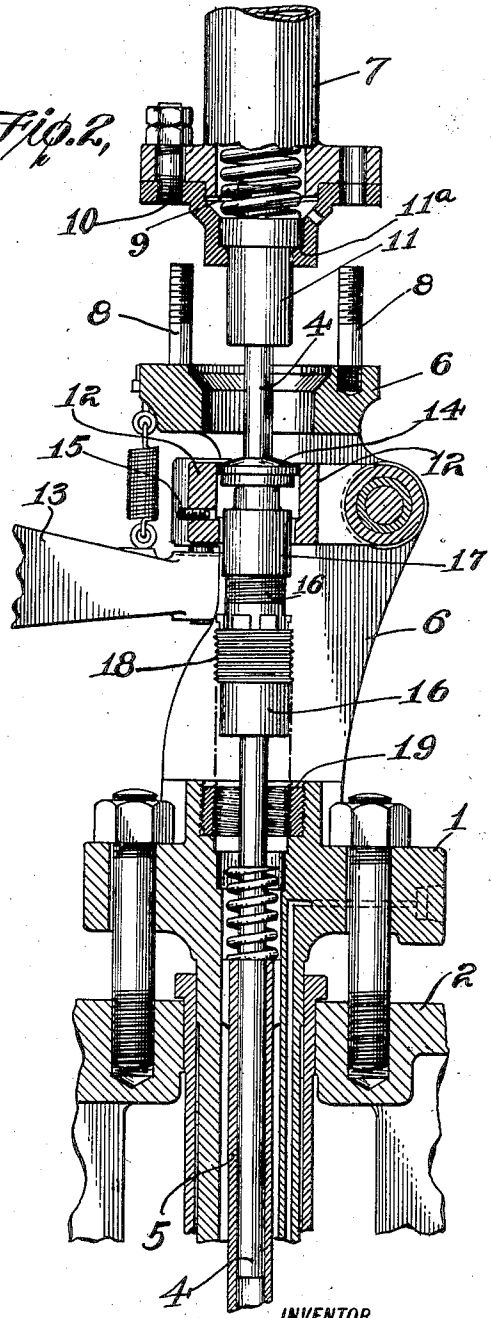


Fig. 2.



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ENGINE INJECTION-VALVE.

1,396,978. Specification of Letters Patent. Patented Nov. 15, 1921.

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To all whom it may concern:

Be it known that I, ADOLF TACCHELLA, a citizen of the Confederation of Switzerland, resident of St. Louis, Missouri, have invented the following described Improvements in Engine Injection-Valves.

This invention is an improvement in the fuel injection apparatus of internal combustion engines and consists more especially in the design of such apparatus whereby the fuel valve or needle as also the atomizing elements can be removed for inspection or grinding without disarranging the valve lever adjustments or the packing which normally seals the passage in which the valve works. In injection type engines re-grinding of the fuel needle is necessary from time to time and the present invention permits the needle to be withdrawn and removed for this purpose with the least labor and delay. The invention consists in disposing the gland containing the packing material in such relation to the other parts that it may be removed from the engine while still mounted on the motion-imparting member which passes through it thereby leaving both the needle and its seat exposed for grinding and permitting a quick replacement in leak-proof manner. The invention more particularly consists in mounting and removing the removable packing gland on the needle itself so that the latter may be ground while the former still remains on the needle and it also consists in an organization of the fuel valve spring in a case in such manner that it is likewise removable with the fuel needle and without release of its compression and so that the spring does not have to be re-compressed when the valve is replaced. The invention also comprises a construction of valve lifter which permits the removal not only of the needle and gland, but also of the fuel atomizing elements without disarranging the setting of the valve operating levers.

In the accompanying drawings, there is shown an exemplification of my invention—

Figure 1 illustrating an axial section of a fuel valve of ordinary type including the seating spring and fuel needle;

Fig. 2 being a similar view with the needle valve, its packing gland and spring case partly removed.

The valve casing 1 is clamped as usual in the fuel valve opening in the engine cylinder 2 and contains within it the seat 3 for the needle valve 4 as well as the atomizer sleeve 5 and its atomizer plates 5^a and the entrance ducts for the fuel oil and air, all as customary in engines of this class. The valve casing also carries an upstanding bracket 6 on which the spring case 7 is bolted by means of studs such as shown at 8. The case contains the spring 9 which closes the valve 4 against its seat and is formed of two parts joined together by bolts 10, one of which is shown in the drawing. The spring 9 confined in the case, thrusts against the head 11 on the valve member 4 and the shoulder 11^a on the head 11 is arranged so that it will abut against the margin of the aperture in the lower member of the case when the latter is removed from the bracket 6 and thus retain the spring under substantially normal compression. When the casing is bolted to the bracket, the shoulder 11^a becomes spaced slightly from the abutment as shown in Fig. 1.

The valve lifter 12, pivoted on the bracket 6 below the spring case, embraces the valve member 4 and the lower part of the head 11 and at its free end is arranged to be engaged by the fuel valve lever 13 which latter operates to swing the lifter upwardly when it opens the fuel valve. The lifter 12 carries a removable thrust plate 14 seated on its interior shoulder and convexed on its upper surface for engagement with the lower end of the head 11. The thrust plate is an annulus encircling the valve 4 and remaining on it when removed as presently explained. A small set screw 15 normally retains it in position in the aperture in the lifter 12. The thrust member 14 represents the point of engagement of the valve operating means with the valve and is situated at a less distance from the top of the bore of the valve casing than the length of the valve member that is within such bore, thus making a compact organization of parts and permitting the bracket 6 to be correspondingly short and rigid. The entrance of the needle valve 4 into the valve casing 1 is sealed by a gland, the barrel 16 and cap 17 whereof surround the valve member as usual. The exterior of the gland barrel is shouldered and embraced by a castellated sleeve nut 18 which can be screwed down into the threaded bushing 19 of the valve casing to clamp the gland barrel to the latter and with the aid of a gasket, or by making the seat with adequate care,

the joint is readily made tight against leakage. The external diameter of the gland and its sleeve nut 18 is less than the internal diameter of the aperture in the lifter 12 so that they will pass through that aperture when the set screw 15 has been unscrewed to release the thrust plate 14. Thus as shown in Fig. 2, by first unbolting the spring case and releasing the set screw 15 and the sleeve nut 18, the needle valve with the spring case, packing gland, and its thrust plate still mounted on it, can be withdrawn from the engine. Neither the spring nor the packing material inside the gland need be disturbed and as these parts are symmetrical in shape and not of large diameter they do not in the least interfere with the process of grinding, nor need the lifter be disturbed or the adjustment between it and the fuel valve lever. The atomizer sleeve and the atomizing elements mounted thereon are also smaller in diameter than the aperture in the lifter and by means of a suitable tool inserted into the atomizer sleeve, these parts may be removed for cleaning or repair without disturbing the lifter lever or its adjustments.

It will now be apparent that the result thus attained may also be secured by the proper coördination of parts according to the principle of the present invention in various different designs of valve structure and it is to be understood that there is no limitation to the specific valve design herein described except as specifically stated in the appended claims.

Claims:

1. The combination in an internal combustion engine of an injection valve casing secured in and to the engine wall and having a valve seat located close to a combustion space, a valve member extending into said casing and engaging said seat, a gland for the valve adapted to be secured in fixed relation to the casing and operating means for said valve member normally engaging the same at a point which is separated from the bore of the valve casing by a distance less than the length of that portion of the valve member that is within said casing, said means being organized to provide a clear opening for the withdrawal of said valve member and its gland from the casing.

2. The combination in an internal combustion engine of a valve casing secured to the engine wall and having a valve seat adjacent the combustion space, a fuel injection valve member coacting with said seat, a fuel atomizer sleeve surrounding said member, a gland removably fixed to the casing and a valve operating member formed to provide a clear opening for the withdrawal of the valve member, atomizer and gland from said casing.

3. In an internal combustion engine, a valve casing, a valve therein, a gland, a spring for seating said valve and a spring-case adapted to maintain the spring under tension when removed from the engine in combination with a valve operating lever constructed to provide a clear opening for the withdrawal of the valve member and gland as a unit from the casing.

4. In an internal combustion engine, a valve casing, a fuel valve and atomizer therein, a packing gland, a spring for seating the valve and a spring case adapted to maintain tension in the spring when removed from the engine, in combination with a valve operating lever constructed to provide a clear opening for the withdrawal of the valve member, the gland and the atomizer.

5. The combination in an internal combustion engine of a valve casing, a fuel valve needle having a seat in the interior of the casing and projecting through a removable packing gland, and an apertured operating means for said valve, the aperture therein being adapted to accommodate the removal therethrough of the valve needle and the gland on it.

6. In an internal combustion engine, a valve member having a packing gland and a valve-opening lever having an aperture adapted to accommodate unit removal of the gland and valve member and a thrust member normally forming a connection between the margin of said aperture and the valve member.

7. In an internal combustion engine, a valve casing bearing a bracket arm, a valve lifter fulcrumed on said bracket and means for actuating it, a valve member in the casing and a gland therefor secured in fixed relation to the casing, said lifter being formed to provide a clear path for the withdrawal of the valve member and gland as a unit from the casing without disturbing the adjustment of the valve lever or said actuating means.

8. In an internal combustion engine the combination of the needle valve 4 and packing gland 16, with the apertured valve-lever 12 and the removable thrust member 14, forming an operating connection between said apertured lever and valve.

9. In an internal combustion engine, the combination of a valve, a fuel atomizer, and a valve operating means, with a valve casing from which said atomizer is removable in the direction of said means without separating said operating means from said casing.

10. In an internal combustion engine, the combination of a valve, a packing gland for the valve, a valve-closing spring outside the gland, means independent of the gland to sustain the thrust of said spring, and a valve-operating means, with a valve casing from

which said valve, gland and spring are removable as a unit and without disturbing the adjustment of the valve operating means.

11. In an internal combustion engine, the combination of a valve, a fuel atomizer and a valve operating means, with a valve casing from which said atomizer is removable in the direction and without disturbing the adjustment of the said valve operating means.

12. In an internal combustion engine, the combination of a valve casing, a valve operating means mounted thereon, a valve, a gland for same, and fuel atomizing means, in which the said operating means are provided with a passage having a clear opening greater than the outside diameters of the said valve, said gland and said atomizing means.

In testimony whereof, I have signed this specification.

ADOLF TACCHELLA.