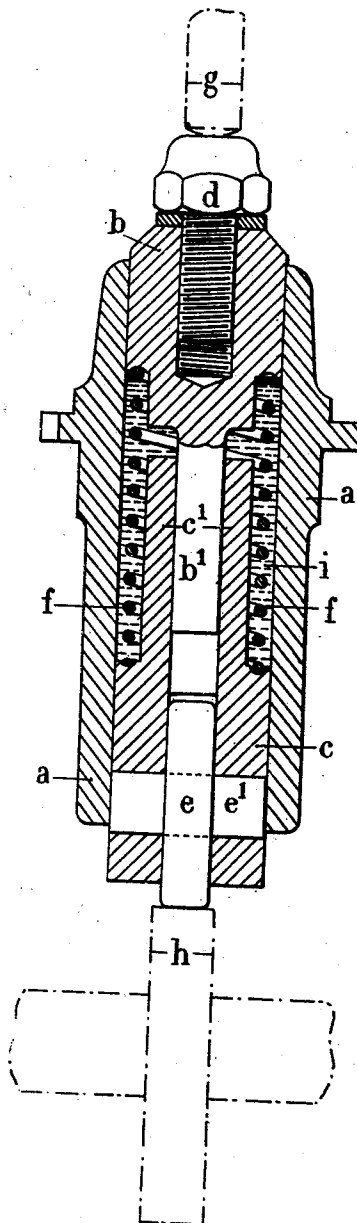


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 PUSH ROD FOR DELIVERY VALVES OF INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED DEC. 14, 1908.

992,677.

Patented May 16, 1911.



WITNESSES :

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PAUL KRÔN, OF LEVALLOIS-PERRET, FRANCE.

PUSH-ROD FOR DELIVERY-VALVES OF INTERNAL-COMBUSTION ENGINES.

992,677.

Specification of Letters Patent.

Patented May 16, 1911.

Application filed December 14, 1908. Serial No. 467,449.

To all whom it may concern:

Be it known that I, PAUL KRÔN, of 7 Rue Collange, in Levallois-Perret, Seine, Republic of France, engineer, have invented a 5 Push-Rod for Delivery-Valves of Internal-Combustion Engines, of which the following is a full, clear, and exact description.

The valves of internal combustion engines operated mechanically are generally lifted 10 by means of an intermediate device interposed between the cam mounted upon the driving shaft and the valve rod. The device usually employed comprises a movable rod or plunger of a single piece transmitting 15 motion from the cam to the valve rod. As the latter is capable of expanding under the action of the heat to which it is submitted during the operation of the motor, it is absolutely necessary to leave a certain clear- 20 ance between the plunger and the valve rod, so as to allow this expansion, for if the plunger or push rod is adjusted without any clearance when the motor is started, the valve will no longer bear upon its seat and 25 the motor will no longer operate when the expansion occurs. The clearance left between the head of the push rod and the tail of the valve however is of great disadvantage when it is desired to obtain a machine 30 the operation of which must be as noiseless as possible. Indeed, the push rod moving at a great speed, when the thrust of the cam takes place, it bears suddenly against the tail of the valve thereby producing a some- 35 what loud noise which is repeated a considerable number of times in a second. Furthermore the impact of the push rod upon the stem of the valve causes a rapid wear of these parts.

40 The present invention has for its purpose to remedy these disadvantages and consists in a push-rod or plunger for operating a delivery valve arranged in such manner as to avoid clearance between this push-rod and 45 the valve.

In the present invention the movable rod serving to operate the valve is divided in two parts which are maintained constantly applied on the valve rod and the operating 50 valve by means of a suitably arranged spring, the contact between the two parts of

the push-rod is effected within a closed chamber and in an oil bath which is automatically fed between the contact surfaces by the displacement of the two parts of said 55 push rod.

The accompanying drawing shows by way of example in vertical section a push rod arranged according to the principle of the invention. 60

As shown in this drawing, this form of push-rod comprises a stationary casing or guide *a* in which can slide two metallic pieces *b* and *c* forming the push rod properly called. The piece *b* which forms the 65 valve actuating member of the push rod carries at its upper part an adjustable abutment *d* and is provided at its lower part with a central rod *b'* which can slide in a socket *c'* with which the piece *c* is provided. 70 The latter piece forms the tappet member of the push rod and is provided at its lower part with a friction-roller *e* mounted on a pin *e'*. The member *b* of the push rod, at its junction with its central rod *b'* forms a 75 shoulder or abutment adapted to be engaged by the upper end of the member *c* which forms a cooperating abutment. The contact surfaces of the two metallic pieces *b* and *c* are maintained apart the one from the other by a coil 80 spring *f* which constantly presses the piece *b* against the rod *g* of the valve and the piece *c* against the cam *h*. As shown in the drawing the members *b* and *c*, have reduced portions which form with the casing or guide a closed 85 chamber containing oil *i*. The coil spring *f* is also contained in this chamber. The oil is automatically fed to the space between the contact surfaces of the pieces *b* and *c*, the displacement of these two pieces *b* and *c* acting as a pump. For the most effective operation of the apparatus thus arranged, it is necessary for the cam which operates the inlet valve to have a special outline giving a much greater lift than the one which is 95 required with the ordinary push-rods, so as to permit of lifting successively the two pieces *b* and *c*.

The operation of the apparatus is as follows: The cam *h* in turning begins to lift 100 the piece *c* which slides in the casing or guide *a* until the socket *c'* meets the lower

part of the piece *b*. The latter is then carried along in its turn and begins to lift the valve.

The apparatus thus arranged has great advantages. In fact, according to the arrangement of the pieces *b* and *c* forming the push-rod the surface of contact of the said pieces is very considerable; furthermore, the part of this push-rod effecting the sudden motions is very light. On the other hand, the oil cushion *i* interposed between the pieces *b* and *c* considerably deadens the shock produced between the pieces *b* and *c* and as the shock takes place within a closed vessel no noise can be transmitted to the outside.

The above arrangements have been given by way of example; the forms, dimensions and detail arrangements can vary according to circumstances without modifying the principle of the invention.

I claim—

1. A valve actuating rod comprising an upper and a lower member, and a casing in which the said members extend, the lower member fitting at its lower end in the lower part of said casing and having a reduced upper portion provided with a central socket, the upper member fitting at its upper end in said casing and having a reduced lower portion corresponding with the reduced portion of the lower member, the adjacent ends of said reduced portions forming cooperating contact surfaces, a central rod extending from the reduced portion of the upper member and engaging the socket in the lower member, the reduced portions of said members forming with the casing a chamber surrounding the contact surfaces and containing oil, the oil filling the space between the contact surfaces of the members, when said contact surfaces are separated.

2. A valve actuating rod comprising two members telescopically engaging each other and having cooperating shoulders or abutments, a casing in which the members extend, the said members being cut away to form with the casing a chamber for oil surrounding the said members and normally communicating near its upper end with a space between the said shoulders or abutments, the oil being drawn from said chamber upon the separation of said shoulders or abutments to fill the said space between the same, and a spring in said chamber and bearing at its ends against the respective members to separate the said shoulders or abutments.

3. In a device for operating the delivery valve of internal combustion engines, the combination with a tappet member having a friction roller for engagement with a cam, the tappet member having an impact surface, a valve actuating member having a surface adapted to receive the impact of said

tappet member and to be operated thereby, the said members telescopically engaging each other, the valve actuating member having an adjustable abutment for engagement with the valve rod, a casing forming a guide in which the said members extend, the said members having reduced portions forming annular shoulders in alinement with each other, the said reduced portions forming with the casing a chamber containing a lubricant, the lubricant surrounding the surfaces of said members which come in contact, for cushioning their impact, and a coil spring arranged in said chamber and engaging the shoulders on said members to hold the same constantly in contact with the said cam and the said valve rod.

4. A valve operating rod comprising two members telescopically engaging each other and having cooperating contact surfaces, a casing in which said members extend, the said members having reduced portions forming annular shoulders in alinement with each other, the said reduced portions forming with the casing a chamber containing a lubricant, and a spring in said chamber surrounding the members at the reduced portion thereof, and bearing on the annular shoulders of said members.

5. A valve actuating rod comprising a tappet member and a valve actuating member, the said members having cooperating contact surfaces, the said valve actuating member having a screw threaded socket in its upper end, and an abutment member for engagement with the rod of the valve to be actuated and having a stem adjustable in said socket, a casing in which the said members extend, the said members having reduced portions forming with the casing a chamber for a cushioning material and a spring arranged in said chamber and engaging said members.

6. A valve operating rod, comprising a tappet member provided with a reduced portion forming an annular shoulder, the said reduced portion having a central opening, and a valve operating member having a reduced portion forming an annular shoulder in alinement with the shoulder on the tappet member, and a rod extending centrally from the end of the reduced portion of the valve operating member and forming a shoulder at said end, the said rod engaging the said socket in the tappet member, the end of the reduced portion of the tappet member and the shoulder at the end of the reduced portion of the valve operating member, forming cooperating contact surfaces, a fixed casing forming a guide in which said members extend, the reduced portions of said members forming with the casing an annular chamber surrounding the reduced portions of said members, the said chamber containing oil adapted to fill the space between the contact

surfaces of the members when the latter are separated to cushion the impact of said surfaces, and a coil spring in said chamber surrounding the reduced portions of said members and engaging the alined shoulders on said members.

The foregoing specification of my push

rod for delivery valve of internal combustion engines signed by me this 1st day of December 1908.

PAUL KRÖN.

Witnesses:

H. C. COXE,

MAURICE H. PIGNET.