S. JOSEPH.

LUBRICATOR FOR VALVE STEMS.

APPLICATION FILED MAR. 20, 1917.

1,263,901.

Patented Apr. 23, 1918.

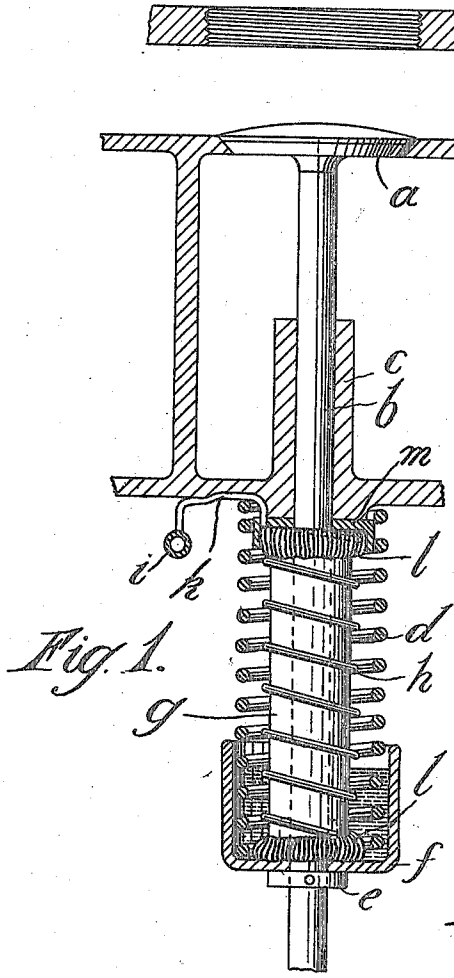


Fig. 1.

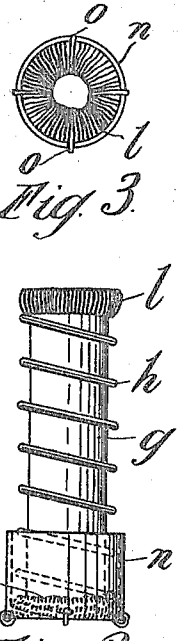


Fig. 2.

Fig. 3.

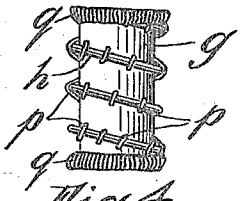


Fig. 4.

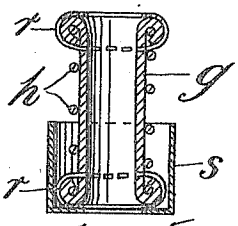


Fig. 5.

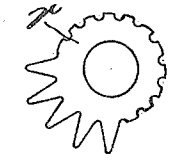


Fig. 6.

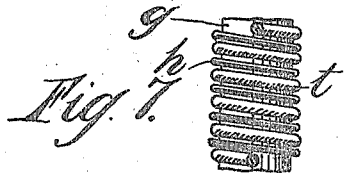


Fig. 7.

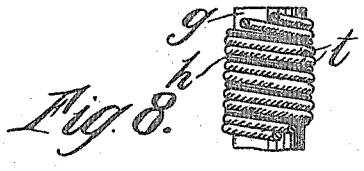


Fig. 8.

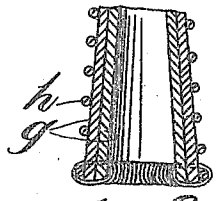


Fig. 9.

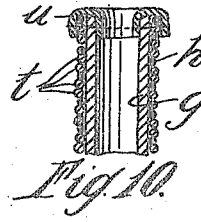


Fig. 10.

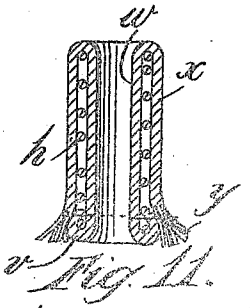


Fig. 11.

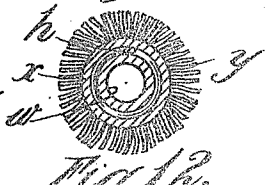


Fig. 12.

Simon Joseph
Inventor
by Lawrence Langner
Attorney

UNITED STATES PATENT OFFICE.

SIMON JOSEPH, OF LONDON, ENGLAND, ASSIGNOR TO BROWN BROTHERS, LIMITED, OF LONDON, ENGLAND.

LUBRICATOR FOR VALVE-STEMS.

1,263,901. Specification of Letters Patent. Patented Apr. 23, 1918.

Application filed March 20, 1917. Serial No. 156,105.

To all whom it may concern:

Be it known that I, SIMON JOSEPH, a subject of the King of Great Britain, and resident of London, W., England, have invented a certain new and useful Improved Lubricator for Valve-Stems, of which the following is a specification.

The present invention relates to the lubrication of valve stems, in particular the stems of the valves of internal combustion engines such as are used on motor vehicles, motor boats, aeroplanes and so forth. Difficulty is frequently experienced in maintaining the effective lubrication of the stems of such valves, particularly of exhaust valves of internal combustion engines, which are liable to become overheated and to stick in their guides. If a device could be provided which would be inexpensive to fit, would not be troublesome to maintain in good working condition, and would always insure the smooth and easy running of all the valves of an engine, it would eliminate a very frequent source of trouble, and would also reduce the actual consumption of power, thus rendering the engine more efficient.

It is the object of the present invention to provide such a device, and it consists essentially of a springy support with a wick or sleeve of absorbent material carried thereby, the size of the device being such that it will surround the valve stem and will lie between the valve guide and spring abutment or collar inside the valve spring. It is kept saturated with lubricant which it applies to the stem as the valve moves up and down, thus maintaining effective lubrication thereof but avoiding the risk of over-lubrication as the stem can only take up a film of oil and there is no continuous flow thereof such as would result if oil were supplied under pressure through channels to the inside of the valve guide.

The invention is illustrated by way of example in the accompanying drawing, wherein:—

Figure 1 shows in section part of a valve and the valve guide of an internal combustion engine, with the lubricating device according to the invention applied thereto.

Figs. 2 to 12 are various detail views of different forms of the lubricating device.

Referring first to Fig. 1, *a* is a valve whose stem *b* passes through the usual guide *c*, the valve being normally held on its seat by a spring *d* pressing on the one hand against the bottom of the valve guide, and on the other hand against a fixed abutment or collar *e* on the stem, or a metal cup *f* which rests on the collar. The lubricating device consists of a tubular wick or sleeve *g* of suitable material secured to a coiled wire spring *h* which is of such a length that it normally just keeps the sleeve *g* stretched tight as shown, while the ends of the device rest on the cup *f* and against the bottom of the guide *c*. As the valve is lifted against the action of its spring *d*, the spring *h* is also compressed, thereby causing the sleeve *g* to slacken and generally to buckle inward at a few places, thus insuring that it will be constantly making a wiping contact with the stem *b*. The sleeve *g* is kept soaked with lubricant, the cup *f* in this case serving to hold a further supply so that the valve stem will be kept lubricated for a long period of running. An additional or alternative method of supplying lubricant is also shown in this figure, the pipe *i* being used which conveys oil from the usual source of supply in connection with the engine, and having a branch *k* leading to each valve lubricator, this branch pipe *k* being laid in a groove in the bottom of the valve guide so that the spring *d* shall not press upon it, and having its inner end bent over to feed oil to the top of the lubricator *g*. The sleeve *g* is shown as having its ends secured to the top and bottom of the spring support *h* by a binding *l* of thread or the like. In Fig. 1 is also shown the use of a washer *m* placed between the bottom of the valve guide and the top of the lubricator; this washer may be in the form of a cap as shown, made of leather, fiber or the like or of metal. It protects the lubricator from the direct heat of the valve guide, or from any exhaust gases which may blow past the stem in case the lubricator is fitted to an old or worn valve stem.

There is generally sufficient room in existing engines for fitting the lubricators inside the valve springs *d* without any alteration, but if necessary in any case, springs *d* of larger diameter can be fitted to an engine in order to leave space for the lubricators upon the stems inside the springs. The wire springs *h* of the lubricators are com-

paratively light and easily compressed as the valves are lifted, so that they make no noticeable difference in the working of the valves. The provision of effective lubrication for the valves however makes a great difference to their working. They are never liable to knock or to stick, and they close and open effectively always in their proper timing, so that the engine runs better and is more economical.

Fig. 2 shows in elevation and Fig. 3 in underneath plan view a lubricator similar to that of Fig. 1, but adapted for use in an engine which may not have cup-shaped abutments or supports for the valve springs which will hold oil. In this case a cylinder *n* of fiber or other suitable material is applied to the bottom of the lubricator, being sewn for example as at *o* to the binding *l*, thus forming a cup into which a little oil can be squirted occasionally from the spout of an oil can thrust between the coils of the valve spring. The sleeve *g* is thus kept always soaked with oil.

Fig. 4 shows in elevation a short lubricator, applicable to a valve having a short spring *d*. It shows how the sleeve *g* of absorbent material may be bound to the coils of the spring *h* at intervals by loops *p*. It also shows another form of binding *q* at the ends, occupying less space.

Fig. 5 shows in section a lubricator having its ends secured by bent metal clasps. Fig. 6 is a plan view showing the metal clasp *r* at the top, partly closed. It has prongs or tongues which are bent over to form a binding around the end coils of the spring *h* and are forced around into the material of the sleeve *g*. Fig. 5 also shows the use of a separate metal cup *s* fitted at the bottom of the lubricator to hold oil.

Figs. 7 and 8 are partial elevations of other types of lubricators, having in the first example a single lace *t* and in the other example two such laces *t* coiled around the sleeve *g* of absorbent material between the coils of the spring *h*. This is intended to provide an additional body or wick of material to hold and carry the oil.

Fig. 9 shows the lower end of a lubricator which is made wide at the bottom, contracting to the diameter to fit around the valve stem higher up. The wide lower end may be useful, where the valve spring is large enough to accommodate it, in holding rather more oil than a straight or cylindrical type of lubricating sleeve can do. This figure also shows the sleeve *g* as being made up of more than one layer of material.

Fig. 10 shows the upper end of a lubricator which has a leather binding *u* sewn on it. The figure also shows in section the round laces *t* between the spring coils *h*, as in Fig. 8.

Fig. 11 shows in elevation, and Fig. 12 in sectional plan, a lubricator having a sleeve which extends both inside and outside the supporting spring *h*. The sleeve has its lower end bound to the bottom of the spring *h* as at *v*; there is then an inner layer *w* of tubular wick material which is turned inside out and rolled back over the spring to form the outer layer *x*; its edges at the bottom may be frayed out to form a fringe *y* adapted to help in soaking up oil from the spring abutment, cup or the like which maintains the supply.

These various types of lubricators have only been shown by way of example, and many other examples might be given. They all depend however on the same principle, that is to say the use of a springy support, and a sleeve or wick of absorbent material carried thereby for feeding the oil to the valve stem. The sleeve need not be a tight fit on the valve stem *b*, as the movements of the sleeve during the alternate compressions and expansions of the lubricator (as the valve lifts and falls) insure that contact between the sleeve and the stem will be made at various points. The compressions tend to squeeze a little oil out of the sleeve, like the action of squeezing a sponge, but in the ensuing expansions the reverse action tends to take place, with the absorption of any excess of oil. Moreover, no more than a film of oil can be carried up on the stem *b* as the top part of the lubricator will wipe off any excess of oil.

If the absorbent material employed is lamp cotton or the like, it may be advisable to treat the same with alum or any equivalent preparation which will render it less liable to be damaged by heating; this is particularly useful in the case of air-cooled engines such as are used on motor bicycles and aeroplanes, where overheating is more liable to occur. The absorbent material might also be formed of asbestos or other non-combustible substance, or it might be made of a mixture including some asbestos fibers. It might also be formed in many cases of felt or flannel and like absorbent substances when no over-heating is to be feared.

Lubricators of the type described can be used on the stems of valves of engines no matter in what position the valves operate. If the valves are in a horizontal or other position it may not be possible to use cups *f* or *s*, or cylinders *n* to hold a supply of oil, but the sleeves of the lubricators themselves will always hold a supply of oil sufficient for a long period of working.

The invention is not limited to the use of lubricators made precisely as described, as the method of mounting the absorbent material on the springy support may be varied and other details may be modified without departing from the scope of the invention.

Having thus described my invention what

I claim as new and desire to secure by Letters Patent is:—

1. A lubricating device for valve stems, comprising a sleeve of absorbent material adapted to surround a valve stem, a helical spring support therefor adapted to keep said absorbent material normally extended in a longitudinal direction, and means for securing the ends of the sleeve to the ends of the helical spring support.

2. A lubricating device for valve stems, comprising a sleeve of absorbent material adapted to surround a valve stem, a helical spring support therefor, means for securing said sleeve to the helical spring support, and a receptacle for oil at the lower end of the device surrounding said sleeve and helical spring support at that end.

3. The combination with a valve and its stem, a valve guide through which the stem passes, a spring abutment on the stem, and a valve spring bearing between said abutment and said valve guide, of a sleeve of absorbent material adapted to lie around the said stem, a springy support adapted to lie around the sleeve, and means securing the ends of the sleeve to the ends of the springy support, said springy support being adapted to extend over the free length of the valve stem between the spring abutment and valve guide, and to be compressed as the valve rises, whereby also said sleeve is alternately contracted and stretched.

4. The combination with a valve and its stem, a valve guide through which the stem passes, a spring abutment on the stem, and a valve spring, of a lubricating device comprising a sleeve of absorbent material and a helical spring support therefor, means for securing the ends of said sleeve to the said spring support, and a cup surrounding the lower end of said spring support, said lubricating device being of such dimensions as to fit around the valve stem inside the valve spring, and to press at its ends against the spring abutment and the valve guide respectively, whereby the sleeve of absorbent material is held so that it may be contracted and stretched alternately as the valve rises and falls.

SIMON JOSEPH.