

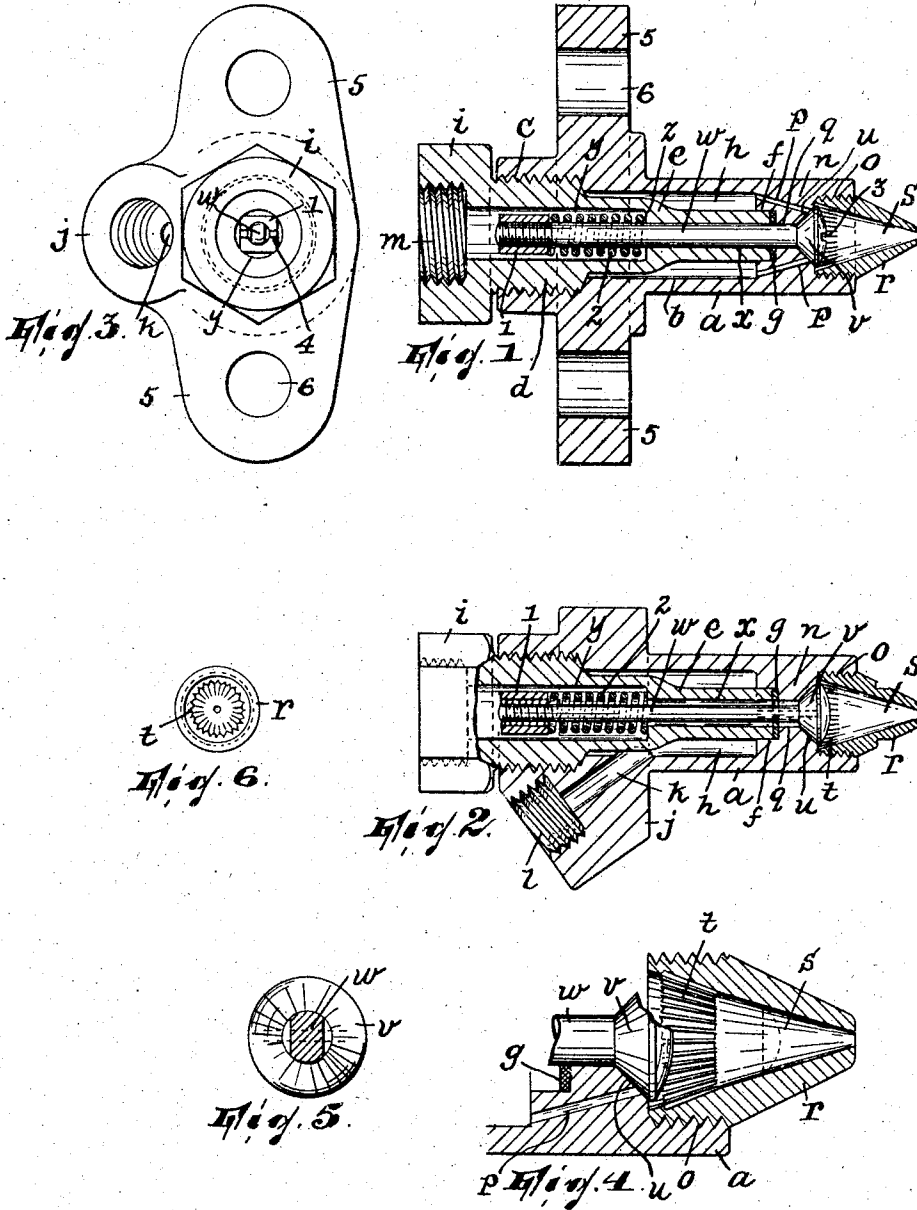
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J. W. HILL.

FLUID COMMINUTING AND MIXING DEVICE.

APPLICATION FILED APR. 16, 1904.



WITNESSES:

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FLUID COMMINUTING AND MIXING DEVICE.

SPECIFICATION forming part of Letters Patent No. 780,752, dated January 24, 1905.

Application filed April 16, 1904. Serial No. 203,396.

To all whom it may concern:

Be it known that I, JOHN W. HILL, a citizen of the United States, residing in Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Fluid Comminuting and Mixing Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to the art of finely dividing fluids by impelling them into contact with mechanical dividing media.

My invention also relates to the art of both finely dividing and commingling two or more fluids by impelling them, more or less unmixed, into contact with mechanical dividing and commingling media.

My invention has for its object to provide a nozzle structure in the use of which the two functions above set forth may be carried to a high state of perfection.

As shown in the drawings, the device is applicable for use in connection with certain kinds of oil-engines, as kerosene-engines, where it is expedient to first mechanically comminute or atomize the oil in order to most expeditiously bring it to the vapor state; but it will be understood upon a view to the whole of the present disclosure that the device has many other adaptations.

My invention will be found fully illustrated in the accompanying drawings, wherein—

Figure 1 is a central longitudinal sectional view thereof. Fig. 2 is a view, partly in elevation and partly in central longitudinal section, the section in this instance being taken in a plane at right angles to that in which the section in Fig. 1 is taken. Fig. 3 is a view of the rear end of the device. Fig. 4 shows the front or discharge end portion of the device the same as it appears in Fig. 1, except

enlarged. Fig. 5 is a rear view of one of the parts immediately concerned in the dividing or dividing and commingling of the fluids, its stem being shown in transverse section; and Fig. 6 is a rear view of the discharge piece or tip of the device.

In said drawings, *a* is a shell having a bore *b*, which extends into the same from its rear end to a point near its front end. The rear end of this bore is somewhat enlarged and internally threaded, as at *c*, and is adapted to have screwed into it the enlarged threaded portion *d* of a nipple *e*, which extends through the bore *b* longitudinally and has its front end set into a recess *f*, where it abuts against a washer *g*, disposed in said recess, when the nipple is screwed in tight. The portion of the nipple which is between the part thereof standing in recess *f* and its threaded portion *d* is of appreciably less diameter than the bore *d*, so that an annular chamber *h* is formed. *i* is a polygonal head formed on the nipple and adapted to receive a wrench for setting the nipple in position in the shell *a*.

A lateral integral projection *j* of the shell is provided with a port *k*, leading into chamber *h* obliquely, and this projection and the head portion *i* of the nipple are tapped, as at *l* and *m*, respectively, to receive the threaded ends of the pipes whereby the fluids are brought to the nozzle.

The end wall or solid portion *n* of the shell *a*, wherein the recess *f* is immediately formed, has an internally-threaded socket *o*, which has communication with the chamber *h* through small ports *p*, penetrating said wall *n*, and also through a large port *q*, disposed intermediate said small ports *p*. Into the socket *o* is screwed a nozzle or discharge-piece *r*, having a conical bore *s*, whose discharge end is its smaller end and whose inner end is internally serrated, as at *t*. The socket *o* is formed with a conical seat *u*, formed concentric with the port *q* and immediately penetrated by the ports *p*. Against this seat is adapted to bear a closely-fitting conical part *v*, which has both

the function of a valve when set against the seat and of a diffuser of fluids escaping through the ports *p* and *q* when said part is not engaged with its seat. In the latter instance the movement of the part *v* away from its seat is limited by contact with the surrounding inside surface of the tip *r*; but since at this time its periphery engages the serrations *t* of the tip it does not entirely cut off the passage through said tip to the fluids escaping through the ports.

The part *v* forms the head of a flattened stem *w*, which extends through port *g*, washer *g*, and the reduced portion *x* of the bore *y* of the nipple *e*. The reduced portion *x* of the bore *y* forms a shoulder at *z*, between which and a nut 1, screwed on the free end of the stem *w*, is held under compression a spiral spring 2, coiled about the stem. The part *v* and nut 1 are formed with cross-cuts 3 and 4, respectively, to receive a screw-driver and spanner for assembling the parts and for adjusting the tension of spring 2.

The flattening of stem *w*, while permitting the latter to be guided true in the nipple, leaves the way through the nipple in the reduced portion of its bore free on both sides of the stem from the seat *v* back to shoulder *z*.

For securing the device in place integral wings 5 are formed on the shell *a*, being perforated at 6 to receive securing-bolts or the like.

In use the fluids are forced into the nozzle under compression, one through port *h* into chamber *h* and the other through bore *y* of the nipple. Through ports *p* and *q* the fluids find their way to the back of the part *v*, which if the pressure is great enough they will force from its seat, overcoming the tension of spring 2. At this point the fluids are first brought together and impelled against the conical face of part *v*, are caused to diverge toward its peripheral portion, whereupon by the serrations *t* they find their way into the bore *s* of the tip *r*, wherein and by the effect of the discharge from the reduced end of said bore they are finally brought to their last stage of comminution and diffusion.

In the above description of the operation it is contemplated that two fluids are treated for the purpose of both finely dividing and commingling them; but it will be understood that the device can be used for simply finely dividing a single fluid.

The valve operates to release the fluid or fluids behind it without other means to overcome the tension of spring 2 than the pressure of said fluids. When two fluids are used, the valve opens or closes to simultaneously permit or stop the discharge of both fluids by simply varying the pressure of one of the fluids.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a tubular structure adapted to receive a compressed fluid or fluids and provided with an outlet having a valve-seat and, opposite to said valve-seat, a conical discharge-opening having its smaller end outermost and its larger end in proximity to said seat, a valve adapted to fit against said seat and movable from the same into the larger end of said discharge-opening, and means for normally pressing said valve against the seat, the portion of said discharge-opening which immediately surrounds the valve when the same is unseated being of substantially the same diameter as the valve and having internal substantially longitudinal serrations, substantially as described.

2. The combination of a tubular structure adapted to receive a compressed fluid or fluids and provided with an outlet having a valve-seat and, opposite to said valve-seat, a conical discharge-opening having its smaller end outermost and its larger end in proximity to said seat, a conical part adapted to fit against said seat and movable from the same into the larger end of said discharge-opening, and means for normally pressing said part against the seat, the portion of said discharge-opening which immediately surrounds said part when the same is unseated being of substantially the same diameter as said part and having internal substantially longitudinal serrations, substantially as described.

3. The combination of a tubular structure having a transverse wall near one end thereof formed with a valve-seat and with ports penetrating said wall and terminating in the valve-seat, a nipple arranged longitudinally in said tubular structure and forming a space between its outer surface and the inner surface of said tubular structure, said tubular structure having a port leading into said space and said nipple having a bore extending therethrough and communicating with one of the ports in the wall of said tubular structure, a valve adapted to seat against said valve-seat, and means for normally pressing said valve against the valve-seat, substantially as described.

4. The combination of a tubular structure having a transverse wall near one end thereof, a nozzle or discharge-piece attached to said end of the tubular structure, said wall having a valve-seat formed on the side thereof adjacent said nozzle and also having ports penetrating it, a nipple arranged longitudinally in said tubular structure and forming a space between its outer surface and the inner surface of said tubular structure, said tubular structure having a port leading into said space and said nipple having a bore extending there-

through and communicating with one of the
ports in the wall of said tubular structure, a
valve adapted to seat against said valve-seat,
and means for normally pressing said valve
5 against the valve-seat, said nozzle having in-
ternal longitudinal serrations disposed around
said valve at the inner end of said nozzle, sub-
stantially as described.

In testimony that I claim the foregoing I
have hereunto set my hand this 9th day of 10
April, 1904.

J. W. HILL.

Witnesses:

MARGIE L. HOLMES,
EDWARD K. NICHOLSON.