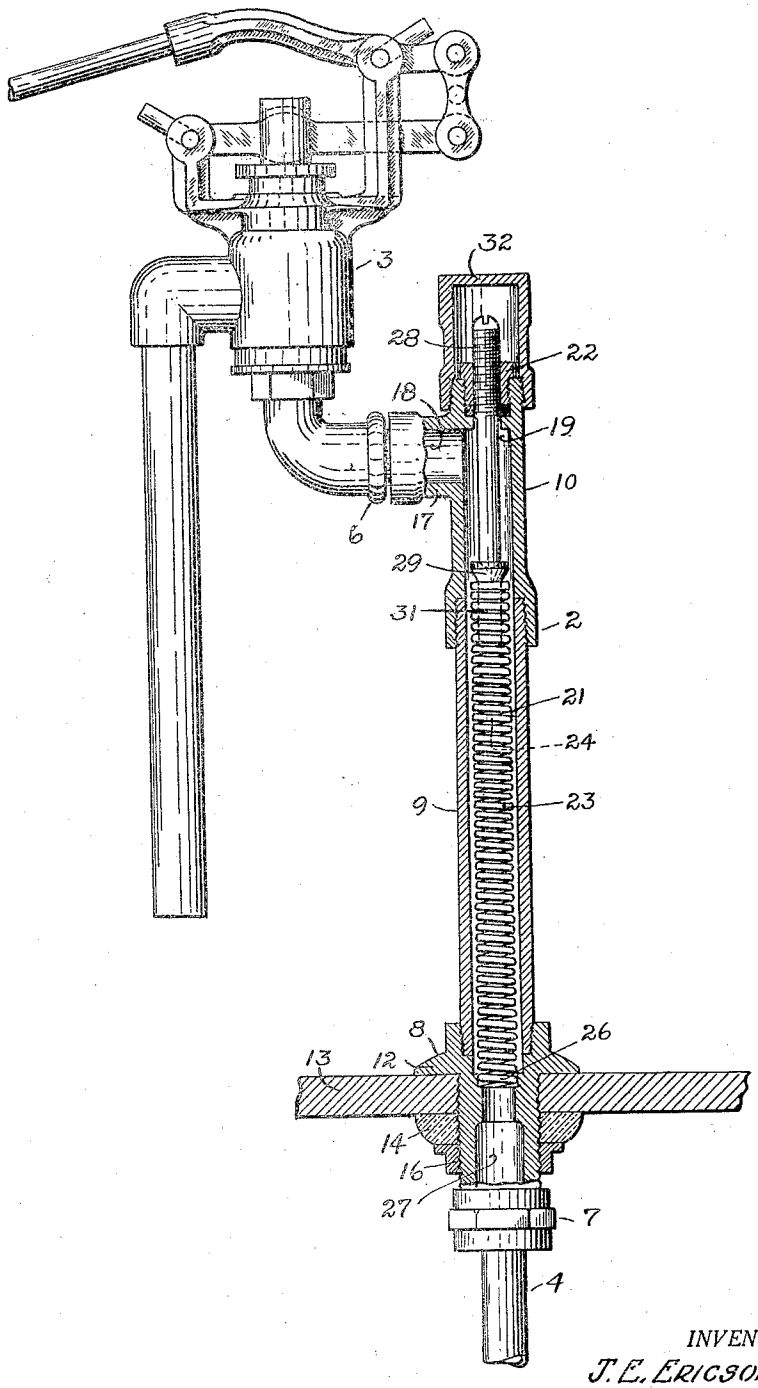
Nov. 24, 1931. J. E. ERICSON 1,833,518

FLUID FLOW SILENCER

Filed April 26, 1926



INVENTOR.
J. E. ERICSON.
BY Joseph B. Gardner
ATTORNEY.

Patented Nov. 24, 1931 1,833,518

UNITED STATES PATENT OFFICE

JOB EDWIN ERICSON, OF OAKLAND, CALIFORNIA

FLUID FLOW SILENCER

Application filed April 26, 1926. Serial No. 104,653.

My invention relates to a device for rendering inaudible the flow of fluid, and which is particularly applicable as a means for silencing the flow of liquids in pipes.

An object of the invention is to provide a device of the character described which will not only serve to silence the sound of flowing fluid, but will also absorb the shocks, both as to audibility and force, caused by changes in the fluid pressure.

Another object of the invention is to provide a device of the class described which will not become clogged with sediment and thereby lessen its efficiency.

A further object of the invention is to provide a device of the class described which will be adjustable to meet varying operative conditions.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of my invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood that I do not limit myself to the showing made by the said drawing and description, as I may adopt variations of the preferred form within the scope of my invention as set forth in the claims.

Referring to said drawing:

The figure shows the device of my invention operatively disposed between a valve and supply pipe leading thereto, the major portion of the device being shown in longitudinal section.

As is well known, the rapid flow of fluids, and particularly that of liquids, through conduits usually produces a sound which is particularly audible and is frequently most annoying. Such sound is, of course, caused by the periodic vibratory response of the conduit walls to the friction of the fluid as it moves longitudinally therealong, so that means contemplating a reduction of the sound must necessarily include the prevention of these sound-producing vibrations. Means causing the fluid to progress spirally through the pipe have been found generally effective for the purpose, but said means has heretofore been built in and so has been subjected to certain structural and operative disadvantages which have served to prevent a general use thereof. Furthermore, the sudden starting or stopping of the fluid flow produces surges, which in the case of liquids such as water, produce mechanical shocks and hammering sounds in the pipe, so that elimination of the possibility of the production of the latter effects is also most desirable.

It will now be noted that in accordance with my invention, both mechanical shocks and the emission of sounds are prevented by means of one device. Briefly, the device comprises the use in a pipe or conduit of a member having a helical port therein through which the liquid is arranged to pass as it moves toward the pipe outlet. Means are provided for adjusting the area of the port so that the quantity flow of liquid therethrough may be controlled.

As illustrated, the silencer device 2 of my invention is operatively disposed between a toilet tank outlet valve 3 and a tank supply pipe 4 and is connected to each by means of suitable couplings 6 and 7 respectively. As here shown, the silencer is formed of connected sections 8, 9, and 10, the former being here shown connected to the pipe 4 by means of the coupling 7 and is adapted to extend through and to have a flange portion 12 thereof clamped against a wall 13 of a tank or the like by means of nuts 14 and 16 arranged for threaded engagement with the section 8 on the opposite side of the wall from the flange 12.

The section 10, it will be noted, is provided with a transverse extension 17 arranged for connection with the coupling 6 and having a bore 18 connecting with the main bore 19 of the section. As here shown, the adjacent ends of the sections 8 and 10 are expanded and are internally threaded to engage the correspondingly threaded ends of the section 9 which is here shown of tubular shape and has the bore 21 thereof of the same size as the bore 19 of the section 10, it being noted that the remote end of the bore 19 is closed by means of a cap 22 arranged for threaded engagement in the bore end.

Mounted in the bores 19 and 21 is a tubular member 23 having the outer diameter thereof somewhat less than the bore diameter to provide a passage outwardly of it and, as here shown, the member 23 preferably comprises a resilient spring defining a cylindrical passage 24 within it. The lower end 26 of the member 23, it will now be noted, is arranged to seat in the section 8, the bore 27 of the latter being of the approximate diameter of the passage 24. Means are provided for holding the member 23 seated against the section 8, and as here shown, such means comprises a set screw 28 mounted in the cap 22 and pivotally engaging a spring seat member 29 arranged to seat against the upper end of the member 23, and to close the bore 27 thereof, it being noted that centering of the member 23 is insured by means of an extension 31 protruding from the member 29 into the passage 24. In this manner, it will now be noted, adjustment of the length of the member 23 may be readily effected, so that the tension and spacing of the turns may be varied at will to satisfy various requirements.

It will now be particularly noted that fluid flowing through the pipe will be delivered inside the helical member 23 and that in passing through the device, it must pass between the various turns of the member 23, which thus combine to provide a port for the fluid, so that the fluid will be given a combined rotary and radial motion which will prevent the passage of the fluid from producing said vibration in the device and will permit the device to absorb any vibrations transmitted to it from the adjacent fluid-carrying members. Furthermore, the effect of a sudden change in pressure at the ends of the member 23 will result in the resilient compression of at least part of it, so that "hammering" shocks are thus absorbed and so do not produce sound vibrations. Control of the maximum rate, or amount, of fluid flow through the device, it will be evident, is readily effected by adjusting the amount of set compression of the member 23 since the effective outlet from the passage 24 may, as previously indicated, be readily controlled. The set screw head may, as here shown, be protected and covered by a cap 32.

It will now be further and particularly noted that the relative movement of the turns of the member 23 occasioned by the fluid flow therethrough will prevent the collection of sediment thereon, so that the device will not need to be cleaned of such sediment as would be the case in devices of the same general class which utilize fixed and inflexible control structures.

Furthermore, though I have here shown the device utilized in combination with a flush tank, it will be evident that it may be inserted in any fluid circuit where noise is to be eliminated. Then too, since the passage of a liquid between the turns of the member separates the particles and therefore would tend to vaporize it, it will be evident that the device of my invention may also be applied for effecting vaporization if so desired.

I claim:

1. A silencer for liquid flowing longitudinally through a conduit comprising a longitudinally compressible tubular member positioned within the conduit in spaced relation from the conduit sides and having a normally open helical port extending through its wall, and means arranged to insure the flow of liquid through said port and longitudinally past the end of the tubular member farthest removed from the intake end thereof as said liquid flows through said conduit.

2. A silencer for fluid flowing longitudinally through a conduit comprising a tubular member closed at one end and positioned longitudinally within the conduit in spaced relation from the sides thereof and having a normally open helical port in the walls thereof, and means operable to adjustably decrease the area of said port, said conduit and tubular member being arranged to cause the liquid to discharge in the direction of the extent and past the end of said member opposite its intake end.

3. A silencer for fluid flowing longitudinally through a conduit comprising a longitudinally and resiliently compressible helical member positioned within the conduit in spaced relation from the sides thereof and in generally coaxial relation thereto, and means manually operable to adjustably vary the length of said member.

4. In a silencer of the character described, a tubular member having a normally open helical port in the walls thereof, means operable to adjustably decrease the area of said port, said member arranged at all times to resiliently resist the operation of said means.

In testimony whereof, I have hereunto set my hand at Oakland, California, this 16th day of April, 1926.

JOB EDWIN ERICSON.