

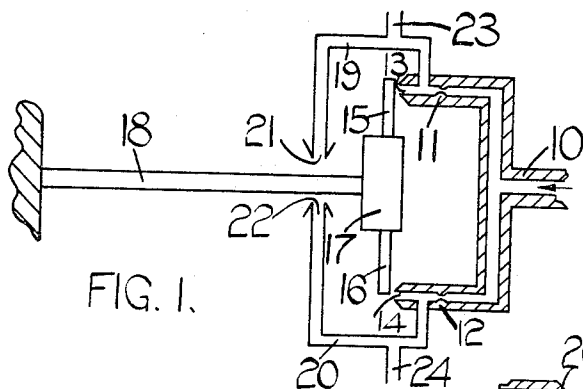
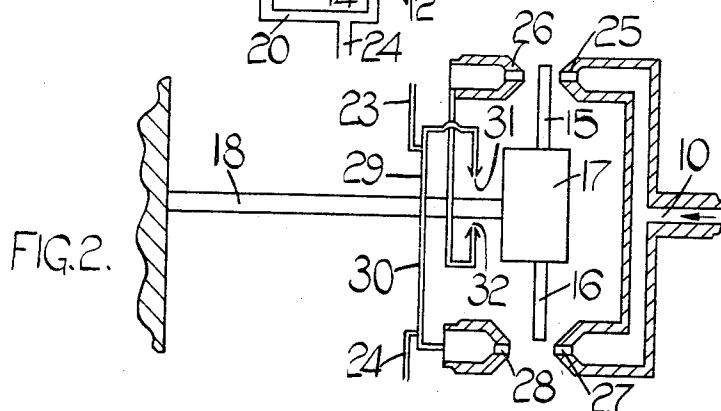
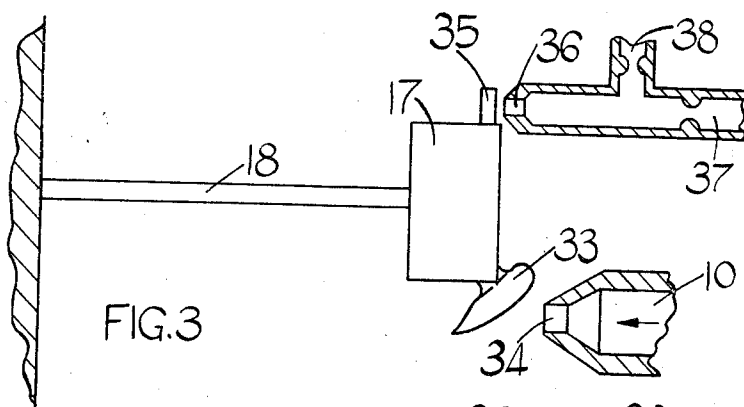
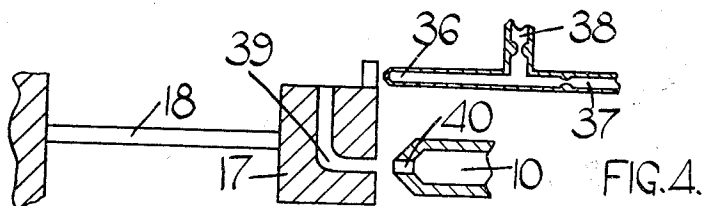
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OSCILLATORS

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OSCILLATORS

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4 Claims

ABSTRACT OF THE DISCLOSURE

An oscillator comprising a member mounted upon a spring for oscillation, there being at least one input supplied in use, with impulses, at least one further passage receiving impulses from the associated input to cause oscillation of the member, and at least one output passage receiving impulses from the associated input, the frequency of the impulses in the output passage being equal to those of the input when the member is oscillating at the natural frequency of the spring.

This invention relates to oscillators which are intended to be actuated by supply of fluid under pressure and the object is to provide such an oscillator in a convenient form.

In accordance with the present invention an oscillator comprises an input passage intended to communicate with a source of fluid at substantially steady pressure, a member carried by a spring and arranged to oscillate under the control of the spring, an input nozzle arranged to communicate with the input passage and disposed adjacent to the member and spring assembly, the arrangement being such that flow of fluid through the input nozzle creates reaction forces tending to oscillate the member and spring assembly at a frequency related to the natural resonance frequency of the assembly and as the member and spring oscillate, the member controls the flow of fluid to the output passage at the same or a multiple of the frequency.

The invention will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a diagrammatic representation of an oscillator constructed in accordance with the invention, and

FIGURES 2, 3 and 4 are alternative forms of oscillators.

The oscillators are intended for use in installations incorporating a source of fluid at steady or substantially steady pressure, and a signal receiving device. The installation is intended to provide, in the examples shown, an output signal to said device in the form of a series of fluid pressure impulses.

Referring to FIGURE 1 the oscillator comprises an input passage 10 connected, in use, to the steady pressure source (not shown), this passage 10 communicating through a pair of restrictors 11, 12 with a pair of input nozzles 13, 14 respectively. Arranged adjacent to the input nozzles 13, 14 are a pair of knives 15, 16 respectively, these being carried by a member 17, which is mounted upon a substantially straight blade-like cantilever spring 18, fixed at one end and upon the other end of which the member 17 is mounted. The arrangement is such that oscillation of the member 17 and spring 18 under the control of the spring results in intermittent interruption of the flow of fluid out of the input nozzles 13, 14 by means of the knives 15, 16 respectively.

Communicating with the passages leading to the nozzles 13, 14 and downstream of the restrictors 11, 12 respectively are a further pair of passages 19, 20 respectively-

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ly terminating in nozzles 21, 22. These are disposed at opposite sides of the cantilever spring 18 respectively.

The input nozzles 13, 14 are, in the rest position of the member 17 and the knives 15, 16 arranged so that, as shown, the nozzle 13 is closed whilst the other nozzle 14 is, at least partly open.

Communicating with the passages 19, 20 are respective outlet passages 23, 24, leading to the device, or devices for receiving the output signals.

In use, steady pressure is applied through the input passage 10 and reaches the nozzles 13, 14. The nozzle 13 however is closed, so that a build up of pressure occurs in the associated passage 19 resulting in a jet of fluid being discharged through the nozzle 21 against one side of the cantilever spring 18, causing the spring 18 and the member 17 to be deflected to a position in which the nozzle 14 is closed by its knife 16. This will open the passage 13 causing the pressure in the passage 19 to decay and at the same time pressure will build up in the passage 20 to cause discharge through the nozzle 22 to deflect the member 17 and the cantilever spring 18 in the opposite direction.

The member 17 and cantilever spring 18 must oscillate at their natural frequency. Each time pressure builds up in the passages 19 or 20, there will be a pressure build up in the associated output passages 23 or 24 respectively. The frequency of the output nozzles in these output passages will be equal to the spring and member natural resonance frequency.

Referring to the construction in FIGURE 2, the member 17 carries a pair of knives 15, 16, which are insertable between pairs of opposed nozzles 25, 26 and 27, 28 respectively, and the fluid received in the receiving nozzles 26, 28 is transmitted through passages 29, 30 to nozzles 31, 32 disposed at opposite sides of the cantilever spring 18 respectively. The mode of operation of this device is similar to that of the construction illustrated in FIGURE 1, the nozzles 25, 26 and 27, 28 being non-symmetrical with respect to the rest positions of the knives 15, 16 so that oscillation of the member 17 and the spring 18 can begin from the rest position.

Referring to FIGURE 3 a simplified form of the oscillator has a deflector plate 33 carried at an inclined angle by the member 17, and this is arranged adjacent to an input nozzle 34 disposed at the end of the input passage 10, the deflector 33 being deflected by the action of fluid pressure from the input nozzle 34. The magnitude of the oscillators is such that the deflector plate 33 moves out of alignment with the nozzle 34 at either end of the stroke so that the spring 18 tends to return to its rest position at which it again receives a deflecting force, thus generating the oscillatory movements. The member 17 also carries a knife 35 adjacent to which is a nozzle 36 communicating with a restricted passage 37. Connected to this passage 37 between the restrictor and the nozzle 36 is an output passage. The passage 37 is, in use, supplied with fluid at a steady pressure and the oscillation of the member 17 will alternatively permit build up and decay of pressure in the output passage 38. In this construction, the deflector plate 33 is shaped to minimise changes in pressures in the input nozzle 34 resulting from proximity of the plate 33 to the nozzle 34.

In the further form of oscillator shown in FIGURE 4 there is an L-shaped passage 39 in the member 17, one limb of which extends substantially in the direction of the length of the spring 18 and is at rest disposed substantially in alignment with an input nozzle formed at the end of the input passage 10, and the other limb of the L-shaped passage 39 terminating in the side face of the member 17 and being arranged to discharge a jet of fluid when registration with the inlet nozzle occurs, thus causing a reaction force tending to deflect the member and

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spring. An output signal is obtained in the manner described in relation to the FIGURE 3 construction, similar parts being designated by like numerals. Other arrangements for producing output signals can be used in one example the fluid emitted from the outlet of the passage 39 in the FIGURE 4 construction can be utilised to control an output signal. The frequency of the output, in this instance will be twice the resonance frequency of the spring and member.

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

1. An oscillator comprising an input passage intended to communicate with a source of fluid at substantially steady pressure, a member carried by a spring and arranged to oscillate under the control of the spring, a knife carried by the member, an input nozzle communicating with the input passage and disposed adjacent to the member and spring assembly, the position of the knife controlling flow of fluid through the input nozzle, a further passage terminating in a nozzle arranged to discharge fluid under pressure from the input passage in a direction to cause oscillation of the spring and member, an output passage communicating with said further passage, the member and knife being disposed to occupy a first position in which flow to the further passage and to the output passage can take place, and a second position in which such flow ceases to occur.

2. An oscillator as claimed in claim 1 in which two input nozzles communicate with the input passage, the member has two knives to control fluid flow through the input nozzles respectively, and two of said further passages, terminating in respective nozzles, are arranged to

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discharge fluid in opposite directions to cause oscillation of the spring and member, and two output passages communicate with the further passages respectively.

3. An oscillator as claimed in claim 1 in which the further passage communicates directly with the inlet passage and the knife is arranged, in its second position, to cut off or restrict flow through the input nozzle, the flow instead occurring through the further passage and also through the output passage, the knife, in its first position, permitting flow through the input nozzle so that flow through the further passage and the output passage ceases to occur.

4. An oscillator as claimed in claim 1 in which a further nozzle is disposed at the end of the further passage, said further nozzle being disposed opposite to the input nozzle, the knife being arranged in its second position, to interrupt fluid flow between the input nozzle and the further nozzle of the further passage, but when the knife is in its first position, flow in the further passage is permitted and flow will also occur in the output passage.

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