Title of the Invention: AN APPARATUS FOR GENERATING POWER
Abstract Title: Domestic water turbine

Power generation apparatus comprises a water container 1 suitable for domestic use, a drainage pipe 4, a turbine 6 within the drainage pipe 4 and arranged to be driven by a flow of water through the pipe 4 to generate electricity. A gate 7 may be provided between the container 1 and drainage pipe 4. The water container 1 may be a bath or sink with the gate 7 being a plug. The water container 1 may be a water storage tank with the gate 7 being a tap downstream of the pipe 4. The water container 1 may be a dishwasher. The water container 1 may be a toilet cistern. There may be provided a water source, such as a mains water pipe 8, for providing water to the container 1, with preferably a tap 9 there between. The drainage pipe 4 may be a drain pipe and the water container 1 may be a gutter. There may be provided a controller for opening the gate 7, preferably in response to the depth of the water in the container 1 reaching a predetermined depth.
An apparatus for generating power

The present invention relates to an apparatus for generating power. More particularly, but not exclusively, the present invention relates to an apparatus comprising a water container adapted for domestic use and a drainage pipe extending from the container, the apparatus further comprising a turbine within the pipe for converting water flow through the pipe into electricity.

The generation of electricity on a domestic scale is not a straightforward matter. One option is to install solar panels on the roof of the home or business. Such panels can be expensive both to install and maintain. Also, in countries such as the UK which are often cloudy such panels may not generate a large amount of electricity. Wind turbines are also an option although on a domestic scale the amount of power generated barely justifies the investment in a wind turbine, and then only in the most favourable of locations.

Mini hydroelectricity systems are also known. To use such a system however one must have a lake or stream with a certain head of water and flow to produce the electricity. US 11/786/062 discloses an alternative mini hydroelectricity system adapted to be connected to the mains water supply. The system comprises a wheel adapted to be rotated in the mains water flow so generating electricity. Such a system requires the pressure of the mains water supply to operate.

The apparatus according to the invention seeks to overcome the drawbacks of the prior art.

Accordingly, the present invention provides an apparatus for generating power comprising

a water container adapted for domestic use;

a drainage pipe connected to the water container; and,
a turbine within the drainage pipe for converting flow of water in the drainage pipe into electricity.

Water often flows from a water container adapted for domestic use, for example a bath or sink, through a drainage pipe to waste. The turbine within the drainage pipe converts the flow of water in the drainage pipe into electricity. The apparatus according to the invention provides a convenient method of generating domestic quantities of electricity, without direct connection to the mains water supply.

Water containers adapted for domestic use are water containers typically in found in buildings used for human occupation such as homes, offices, schools, factories etc. Typically the water container comprises a sink, bath or water tank. Such water containers as reservoirs which are used for the production of electricity on an industrial scale are not water containers adapted for domestic use.

Preferably, the apparatus further comprises a gate for controlling the flow of water between the water container and the drainage pipe.

The water container can be a bath or sink.

Preferably, the gate comprises a plug.

The water container can be a water storage tank.

The gate can comprise a tap, preferably arranged downstream of the drainage pipe.

The water container can be a dishwasher.

The water container can be a cistern.
The apparatus can further comprise a water source for providing water to the water container. The water source can be a mains water source, preferably a pipe.

The apparatus preferably comprises a gate, preferably a tap, between water source and water container.

The drainage pipe can be a drain pipe.

The water container can comprise a gutter.

The apparatus can comprise a gate between gutter and drain pipe.

The water container and drainage pipe can be separate portions of the same drain pipe, the portions being separated by the gate.

The apparatus can further comprise a controller for opening the gate.

Preferably, the controller opens the gate when the depth of the water in the water container reaches a predetermined depth.

The present invention will now be described by way of example only and not in any limitative sense with reference to the accompanying drawings in which

Figure 1 shows a first embodiment of the invention in cross section;

Figure 2 shows a second embodiment of the invention in cross section;

Figures 3(a) and 3(b) show further embodiments of the apparatus according to the invention; and,
Figure 4 shows a further embodiment of an apparatus according to the invention in cross section.

Shown in figure 1 is a first embodiment of an apparatus according to the invention in cross section. The apparatus comprises a water container adapted for domestic use 1, which in this embodiment is a bath tub. A plug hole 2 extends through the base 3 of the bath tub 1. Connected to the plug hole 2 of the bath tub 1 is a drainage pipe 4 which in turn is connected to the drainage system 5. Arranged within the drainage pipe 4 is a turbine 6.

In use a gate 7 comprising a plug 7 is arranged in the plug hole 2 and the bath tub 1 filled from a water source 8. In this embodiment the water source 8 is a mains water pipe 8. The flow of water to the water container 1 from the water pipe 8 is controlled by a gate 9 which in this embodiment is a tap 9. In an alternative embodiment the water source 8 is a tank. When the user has finished using the bath 1 the plug 7 is pulled and the bath 1 drains through the drainage pipe 4. The flow of water through the drainage pipe 4 turns the turbine 6, so generating electricity. This electricity is stored in a battery (not shown).

In an alternative embodiment the electricity generated is fed directly to the mains ring.

Arranged above the turbine 6 is a filter 10 for removing particulate matter such as hair from the waste water which drains from the bath 1. The filter 10 is adapted to be changed or cleaned at regular intervals. The apparatus according to the invention is typically used in combination with a water hardness filter (not shown) connected to the water supply. The water hardness filter extends the life of the apparatus.

In an alternative embodiment of the invention the water container adapted for domestic use 1 is a sink, rather than a bathtub.

Shown in figure 2 is an alternative embodiment of an apparatus according to the invention. In this embodiment the water container adapted for domestic use 1 comprises a
water tank 1, typically high up in a building. Attached to the water tank 1 is a drainage pipe 4 which splits into a plurality of sub pipes 11 as shown. Arranged within the drainage pipe 4 is a turbine 6. In the embodiment of figure 1 the plug 7 acts as a gate 7 controlling flow of the water from the domestic water container 1 to the drainage pipe 4. In the embodiment of figure 2 each subpipe 11 ends in a tap 7 which acts as a gate 7. When a tap 7 is opened water flows along the drainage pipe 4 though the turbine 6 and then through the tap 7.

It is possible to use the embodiments of figures 1 and 2 in combination. The apparatus of figure 2 can be used to fill the bath of figure 1. The same water will therefore turn two turbines 6 on its journey from the water tank 1 to the drainage system 5.

In a further embodiment of the invention (not shown) the water container 1 comprises a cistern 1. The drainage pipe 4 extends from the cistern 1 to a toilet bowl. A ball cock and valve type arrangement is used to control the flow between cistern 1 and bowl. When the toilet is flushed the draining of the cistern 1 turns the turbine 6 so generating electricity.

In alternative embodiments of the invention (not shown) the water container adapted for domestic use 1 comprises a dishwasher and the turbine is arranged within the dishwasher drainage pipe. In a further alternative embodiment the water container adapted for domestic use 1 comprises a washing machine. In both of these embodiments the gate 7 comprises a valve connected to the drainage pipe 4. At the appropriate point in the cycle of the dishwasher or washing machine the valve opens and the water passing along the drainage pipe 4 turns the turbine 6.

Shown in figure 3(a) is a further embodiment of an apparatus according to the invention. In this embodiment the water container adapted for domestic use 1 is a gutter 1 and the drainage pipe 4 is a drain pipe 4. In this embodiment there is a gate 7 between the gutter 1 and drain pipe 4. When the water in the gutter 1 fills above a predetermined level, the gate 7 opens allowing the water to flow down the drainpipe 4 to the turbine 6, so turning the turbine 6 and generating electricity.
In an alternative embodiment there is no gate 7 between the gutter 1 and drainpipe 4. However, if the rainfall is light or the collection area of the gutter 1 too small then the flow of water may not be sufficient to turn the turbine 6.

Figure 3(b) shows a further embodiment of an apparatus 1 according to the invention. In this embodiment the gate 7 is arranged part way down the drain pipe 4. The portion of the drain pipe 4 above the gate 7 along with the gutter 1 comprises the water container 1 adapted for domestic use. By positioning the gate 7 part way down the drain pipe 4 one can build up a larger head of water above the turbine 6 than in the embodiment of figure 3(a). In this embodiment there is a sensor (not shown) located above the gate 7. When the water level reaches the sensor it opens the gate 7. In an alternative embodiment the sensor is a pressure gauge. When the pressure on the gate 7 reaches a predetermined level the gate 7 opens.

In a further embodiment of the invention (not shown) the apparatus comprises a pipe having a gate 7 part way along its length. The portion of the pipe 7 on one side of the gate 7 is the water container adapted for domestic use 1. The portion on the other side of the gate 7 is the drainage pipe 4. In this embodiment the apparatus lacks the gutter. Such an apparatus may be attached to a water pipe. In use the apparatus receives the output of the water pipe and the gate 7 opens when the water level above the gate 7 reaches a predetermined level. The faster the water leaves the water pipe the more frequently the gate 7 opens. If the frequency of the opening and closing of the gate 7 becomes too high then the gate 7 may lock in the open position. Water then drops straight through to the turbine 6, turning the turbine 6.

Shown in figure 4 is a further embodiment of the invention. This embodiment is a combination of other embodiments of the invention described above. As water travels from the water tank to the ground it passes though a number of turbines 6 so generating electricity.
CLAIMS

1. An apparatus for generating power comprising
   a water container adapted for domestic use;
   a drainage pipe connected to the water container; and,
   a turbine within the drainage pipe for converting flow of water in the drainage pipe into electricity.

2. An apparatus as claimed in claim 1, further comprising a gate for controlling the flow of water between the water container and the drainage pipe.

3. An apparatus as claimed in either of claims 1 or 2, wherein the water container is a bath or sink.

4. An apparatus as claimed in claim 3, when dependant on claim 2, wherein the gate comprises a plug.

5. An apparatus as claimed in either of claims 1 or 2, wherein the water container is a water storage tank.

6. An apparatus as claimed in claim 5, when dependent on claim 2, wherein the gate comprises a tap, preferably arranged downstream of the drainage pipe.

7. An apparatus as claimed in either of claims 1 or 2, where in the water container is a dishwasher.

8. An apparatus as claimed in either of claims 1 or 2, wherein the water container is a cistern.
9. An apparatus as claimed in any one of claims 1 to 8, further comprising a water source for providing water to the water container.

10. An apparatus as claimed in claim 9, wherein the water source is a mains water source, preferably a pipe.

11. An apparatus as claimed in either of claims 9 or 10, further comprising a gate, preferably a tap between water source and water container.

12. An apparatus as claimed in either of claims 1 or 2, wherein the drainage pipe is a drain pipe.

13. An apparatus as claimed in claim 12, wherein the water container comprises a gutter.

14. An apparatus as claimed in claim 13, when dependent on claim 2, comprising a gate between gutter and drain pipe.

15. An apparatus as claimed in claim 12, when dependant on claim 2, wherein the water container and drainage pipe are separate portions of the same drain pipe, the portions being separated by the gate.

16. An apparatus as claimed in claim 2, further comprising a controller for opening the gate.

17. An apparatus as claimed in claim 16, wherein the controller opens the gate when the depth of the water in the water container reaches a predetermined depth.

18. An apparatus substantially as hereinbefore described.
**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

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<th>Category</th>
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<td>X</td>
<td>1-7, 9-11, 16</td>
<td>US4352025 A (Troyen): See figures 1 and 2 in particular.</td>
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<tr>
<td>X</td>
<td>1-5, 9-11</td>
<td>KR200232457 A (Kim et al): See figure 3 in particular.</td>
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<td>X</td>
<td>1, 2, 5, 9, 12-17</td>
<td>DE29711026 U1 (Winterstein): See the figure in particular.</td>
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<tr>
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<td>1, 2, 5, 9, 10, 12-15</td>
<td>JP2004308638 A (Nishi Denki KK): See figure 1 in particular.</td>
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<td>US6877170 B1 (Nicole Family Trust): See figure 2 in particular.</td>
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<td>JP2003253726 A (Hashimoto Sangyo KK): See figures 1, 2 and 6 in particular.</td>
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<tr>
<td>X</td>
<td>1-7, 9-11, 16</td>
<td>JP2003254220 A (OKI Electric Ind Co Ltd): See figure 1 in particular.</td>
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| X Document indicating lack of novelty or inventive step | A Document indicating technological background and/or state of the art. |
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**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC:

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Worldwide search of patent documents classified in the following areas of the IPC

| F03B   |

The following online and other databases have been used in the preparation of this search report

| EPODOC, WPI |

### International Classification:

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