WHAT IS CLAIMED IS:

1. A reciprocating submerged membrane filtration apparatus comprising:

a membrane tank comprising a submerged membrane, the membrane tank configured to intake influent wastewater to be treated, the influent wastewater being filtered through the submerged membrane to produce treated water;

a reciprocation apparatus configured to move the submerged membrane to create an inertia force which shakes foulants off from the submerged membrane under oxygen-deficient conditions; and

a recirculation line configured to recover a portion of the produced treated water discharged from the membrane tank and to recycle the recovered treated water to a treatment tank disposed upstream of the membrane tank, the treatment tank configured to biologically treat the influent wastewater.

2. The reciprocating submerged membrane filtration apparatus of claim 1, wherein the submerged membrane is configured to be reciprocated back and forth at a frequency of 2 Hz or less and an amplitude of 10 mm or more.

3. The reciprocating submerged membrane filtration apparatus of claim 1, wherein the submerged membrane is configured to be reciprocated back and forth at a frequency of 1 Hz or less and an amplitude of 30 mm or more.

4. The reciprocating submerged membrane filtration apparatus of claim 1, wherein the submerged membrane is configured to be reciprocated back and forth at a frequency of 0.5 Hz or less and an amplitude of 40 mm or more.

5. The reciprocating submerged membrane filtration apparatus of claim 1, wherein the submerged membrane is reciprocated back and forth at a frequency of 0.2-0.5 Hz, and

wherein a flocculant inlet is disposed upstream of the membrane tank so that both flocculation by a flocculant and filtration occurs in a single membrane tank.

6. The reciprocating submerged membrane filtration apparatus of claim 1, wherein the treatment tank comprises a selenium reduction tank configured to biologically treat wastewater containing selenium oxide under anoxic or anaerobic conditions to produce intermediate treated water and to feed the intermediate treated water to the membrane tank.

7. The reciprocating submerged membrane filtration apparatus of claim 6, further comprising:

a flocculant inlet configured to introduce a flocculant to the intermediate treated water produced in the selenium reduction tank before the intermediate treated water is fed into the membrane tank.

8. The reciprocating submerged membrane filtration apparatus of claim 1, wherein the treatment tank comprises an anaerobic digester configured to biologically treat influent wastewater containing an organic compound by anaerobic digestion under anaerobic conditions to produce sludge and to feed a supernatant above the sludge to the membrane tank.

9. The reciprocating submerged membrane filtration apparatus of claim 1, wherein the treatment tank comprises a high-rate digester configured to mechanically agitate influent wastewater containing an organic compound in a mixer, to heat the influent wastewater by a

sludge heater to produce intermediate sludge and to feed the intermediate sludge to the anaerobic digester, in which the high-rate digester comprises a two-stage anaerobic digester together with the anaerobic digester.

10. The reciprocating submerged membrane filtration apparatus of claim 1, wherein the submerged membrane comprises a microfiltration (MF) membrane or an ultrafiltration (UF) membrane.

11. A reciprocating submerged membrane filtration apparatus comprising:

a membrane tank comprising a submerged membrane, the membrane tank configured to intake influent wastewater to be treated, the influent wastewater being filtered through the submerged membrane to produce treated water; and

a reciprocation apparatus configured to move the submerged membrane to create an inertia force which shakes foulants off from the submerged membrane under oxygen-deficient conditions,

wherein the reciprocation apparatus comprises:

a rotor connected to a sliding frame via a shaft; and

a sliding frame connected to the submerged membrane,

wherein the sliding frame is configured to reciprocate the submerged membrane.

12. The reciprocating submerged membrane filtration apparatus of claim 11, wherein the reciprocation apparatus further comprises a motor connected to a pulley via a belt, the motor configured to rotate the rotor to generate rotational motion and convert the rotational motion into reciprocating motion of the sliding frame through the shaft.

13. The reciprocating submerged membrane filtration apparatus of claim 11, wherein the sliding frame comprises:

a damper provided between the sliding frame and the shaft so as to reduce shock load caused by reciprocating motion; and

linear bearings and pillow block supports provided between the sliding frame and a slide rail such that the sliding frame is movable along the sliding rail via the linear bearings and pillow block supports.