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## **Description**

The invention is a system for gradual and automatic reduction of the weight during training for a conventional fitness machine with weights.

## **Area of application in technology**

The invention will find application in the home and professional fitness equipment.

## **Current state of technology**

Fitness machines (home and professional in gyms) at the moment work with weights in the form of metal or other heavy plates. The person that exercises can choose fixed weight before starting the exercise. The weight remains unchanged till the end of the exercise (end of the series of repetitions), which makes the last repetitions particularly heavy due to the exhaustion in the muscles. This system of fixed weights has not changed in essence for decades. A wide market research around the web and respectively the world did not uncover any different methods for training in fitness machines other than using heavy plates. I propose a different system for resistance/weights for fitness machines based on liquid, such that weight can be reduced gradually and automatically by the outflowing liquid with a rate chosen by the person that exercises (the user).

## **Technical essence**

The essence of the new system is in the replacement of the weight plates with weight of liquid in a container. This allows the weight to decrease during the exercise by the liquid flowing out of the container. The weight reduction does not need any intervention by the user, who can choose the initial weight and the rate of reduction during training. The following advantages over existing fitness machines result from this system:

- 1) The weight is inversely proportional to the fatigue in the muscles and the user doesn't feel overwhelmed by the weight or incapable of lifting it at any time. The feeling is improved and injury is less likely to occur.
- 2) The user can accomplish many more repetitions with a constantly reduced weight (recommended 30 to 50 reps.) such that initially the user will lift large weight (train for strength) and subsequently do a lot of repetitions with a smaller and smaller weight (train for shape and endurance)
- 3) During such exercise (also known as "drop set" when done with dumbbells) the muscles get fully exhausted without too much stress and difficulty on the user. Usually a single series of repetitions (30 – 50) is sufficient for a given muscle group. This muscle exhaustion with variable weight leads to faster and better results (shape, strength and endurance) because it

works all muscle fibers due to the full range of weights lifted by the muscle (from very heavy to very light).

## Description of figures attached

**Figure 1:** Conventional multi-purpose fitness machine with the proposed system for gradual automatic weight reduction by using liquid.

**1A:** Upper container that replaces the metal weight plates (transparent and containing liquid that weights as much as the metal plates that come with the machine).

**1B:** Lower container that contains the drained water (volume equal to 1A).

**1C:** Plastic pipes integrated in the upper container that will house the weight guiding metal rods.

**1D:** Flexible pipe with 1.5 meters length and 1,1/4" (inch) diameter.

**1E:** Pump with 1Kw power.

**1F:** Valve with 1,1/4" (inch) diameter.

**1G:** One way valve at the sucking end of the pump.

**1H:** Moving direction of the upper container 1A.

**1I:** Conventional multi-purpose machine for home use.

**Figure 2:** Compact setup of the system where the upper tank sites on top of the existing weight plates and the bottom tank wraps around the plates. This setup is much more compact and ready for production. It also allows the user to choose to lift a number of weight plates along with the upper tank – this allows the weight to not drop to zero, but rather to the weight of the remaining plates. This gives even more control over how to train.

## Implementation examples

- 1) The system can replace the metal weight plates of almost every fitness machine with weights (fig. 1I) with minimal design changes and additions. The proposed implementation method with container with liquid (upper container – fig. 1A) attached with a flexible pipe/hose (fig .1G) to a container for the outflowing liquid (lower container fig.1B) equipped with a pump (fig.1E) and liquid control valve (fig. 1F). The working/training cycle starts with starting the pump from a switch and waiting for the desired weight (liquid level) to enter the upper container (the container has a scale on the outside with the weights corresponding to the liquid level) and stopping the pump. The control valve (fig.1F) is then turned into the desired position, which determines the rate of weight reduction. The user would exercise till the upper container is empty and the cycle can start over. The liquid is not lost, but rather moved between the containers. The upper container is relatively transparent and the liquid is

colored so it's easy to spot the weight level on the scale. The upper container fits liquid that weighs as much as the metal plates that come with the machine. The guiding rods pass through the pipes (fig. 1C) embedded in the container, such that the bottoms of the pipes are sealed against the bottom of the container so no fluid leaks out. The bottom of the upper container is higher than the top of the lower container so that the liquid can easily flow to the bottom container at all times. The pipe/hose (fig. 1D) is flexible (similar to the vacuum cleaner hoses), with length of 1.5 meters and 1,1/4" (inch) diameter. The hose splits in two just before entering the bottom container. One branch goes to the pump (about 1kw power), which is placed at a lowest point of the bottom container (the top of the container should have a lower point somewhere for the pump). A one way valve (fig. 1G) is placed at the sucking end of the pump so it never runs dry (sucks air). There is a switch for the pump located at a convenient place on the fitness machine (the back of the seat for example).

The other branch of the hose ends with a control valve with 1,1/4" (inch) diameter and enters the bottom container. The branches to the valve and the pump is needed as the reverse flow through the pump is not sufficient and the pump ends with a one way valve anyway. In other words the emptying the upper container goes through the valve branch and the filling of the upper container goes through the pump branch when the valve is closed.

The bottom tank has a compact shape and it is very flat (under 25cm) so that the liquid can flow into it easily. The bottom tank is the same volume as the upper tank. It has a lower point on the top for mounting the pump so it never runs dry. The bottom tank better be kept behind the machine so that it sticks out only where the valve is mounted so it's easy to access. Both tanks have to be made of plastic or lighter material. Both tanks and the pump have to be very compact and attractive if possible.

- 2) Another implementation option is to replace the metal weigh plates with an electro-mechanic resistance system, where the resistance/weight is controlled by a computer, which controls an electric motor attached to the cable that held the weight plates. When lifting up the motor works as an electric generator, where the current is ran through variable resistor element, controlled electronically so weight can be reduced gradually and automatically. Dropping the weight can be simulated by sending current to the motor so it pulls the cable.

Fig. 1

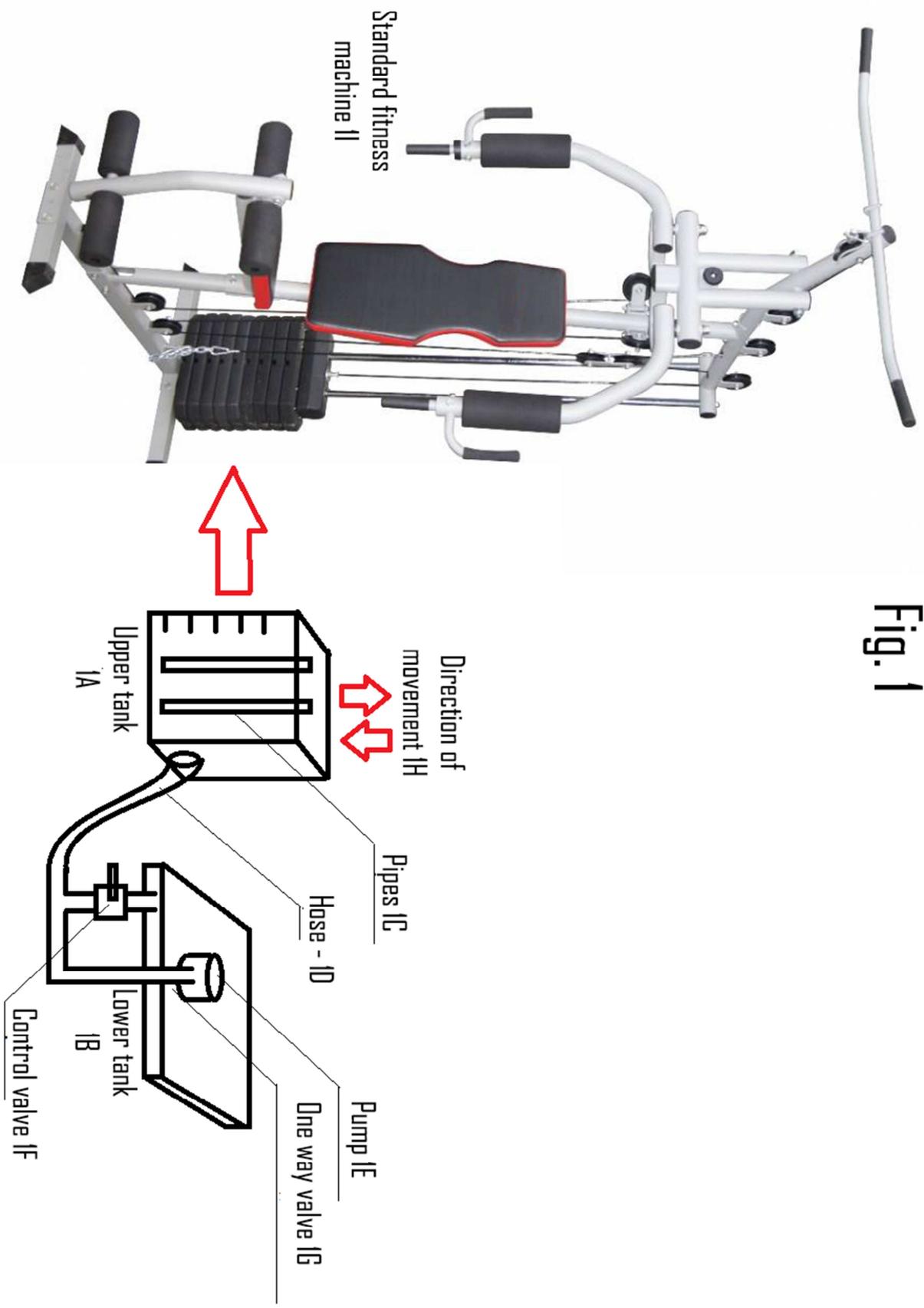


Fig. 2

