





# Gym machines for simulating training of technical movements in curling

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## ABSTRACT

Curling is a team sports game played on ice. The athletes slide stones one by one toward a marked target area. This is a sport in which the exactness of a throw is the base of technique and one of the main components of a successful play. In sport, technique means the way of making a physical action. Technical preparation is a process of education and improvement of movement skills, serving a mean of sports fighting. For making a throw of a curling stone an athlete has to push himself off a hack and slide in a deep lunge position holding a stone in his hand. In front of the hog line an athlete releases the stone. This paper describes the machines for training the technique of throwing a curling stone. Using empirical research methods we have created and used the machines which were used during the training process at the special preparation stage of the preparation period. A special training roller ground for throwing curling stones was developed. The useful model RU 192760 patent was published on September 30, 2019. The developed equipment allows to do imitative training of movements and technique of curling stones throwing. A training roller ground for a curling player's boot was designed. The useful model RU 193702 patent was published on November 11, 2019. The conditions for simulating training of exactness of take-off force in curling were created.

**Keywords:** Performance analysis of sport, Physical conditioning, Technical training, Patent, Training roller ground.

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## INTRODUCTION

Curling is a team sport played on ice. The athletes, in two teams, slide stones one by one toward the *house*, a 3.66m target just over 45m from the release area (Figure 1).



Figure 1. About curling.

Success in curling is determined by many factors, one of which is technical exactitude (technique) in the throw (release) of the stone. In sport, technique is the means by which a motor action, or a motor skill is executed with technical preparation being the means by which motor skills are developed and improved. In preparation for competitive sport, this preparation involves education and training.

To make throws in curling, an athlete has to push off a hack, which is a backboard against which they can push backwards with one foot to, in turn, propel themselves forward. The curler will then slide in deep lunge positions holding a round granite stone weighing approximately 19 kg before releasing it in front of a line known as the hog line. It can be a physically demanding sport requiring much physical and technical preparation, both on and off the ice. This paper describes a machine that we have developed for 'off-ice' technical training. Its specific aim is to develop technique for throwing a curling stone.

To understand the principle of work of the gym machines it is necessary to regard the elements of curling stone throwing. The first one is getting the starting position before pushing of the hack, which includes the placement of the foot into the hack (crouch and grip of the stone), the second one is pushing oneself off the hack with a stone, the third one is the athlete sliding with the stone inside the allowed borders according to competitions rules (Figure 2). This element also includes the release of the stone and set.

The machines which will be presented in our paper influence two important elements – pushing off the hack and release of the stone with the hand.

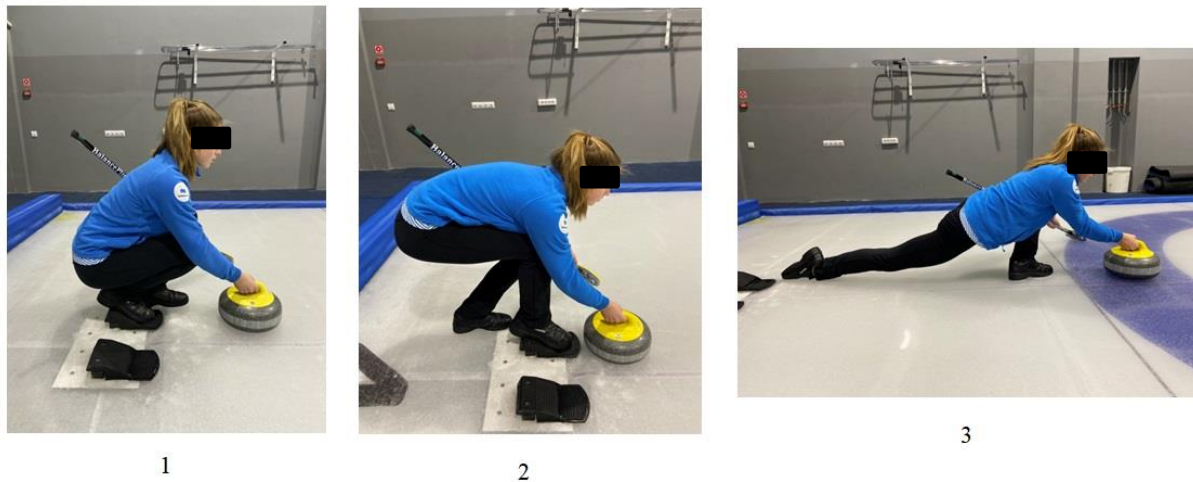


Figure 2. Pushing oneself off the hack with a stone.

## METHODS

Taking cognizance of research findings, machines were developed for use during a specific period of the training plan, namely during the (sports) specific preparation period of the preparation phase.

The speed of sliding during the outrun is mainly formed by the muscles of the leg used by the player to push off the hack. The effort, necessary during pushing off the hack, can be practiced until it becomes automatic with the help of our first device (Figure 3).

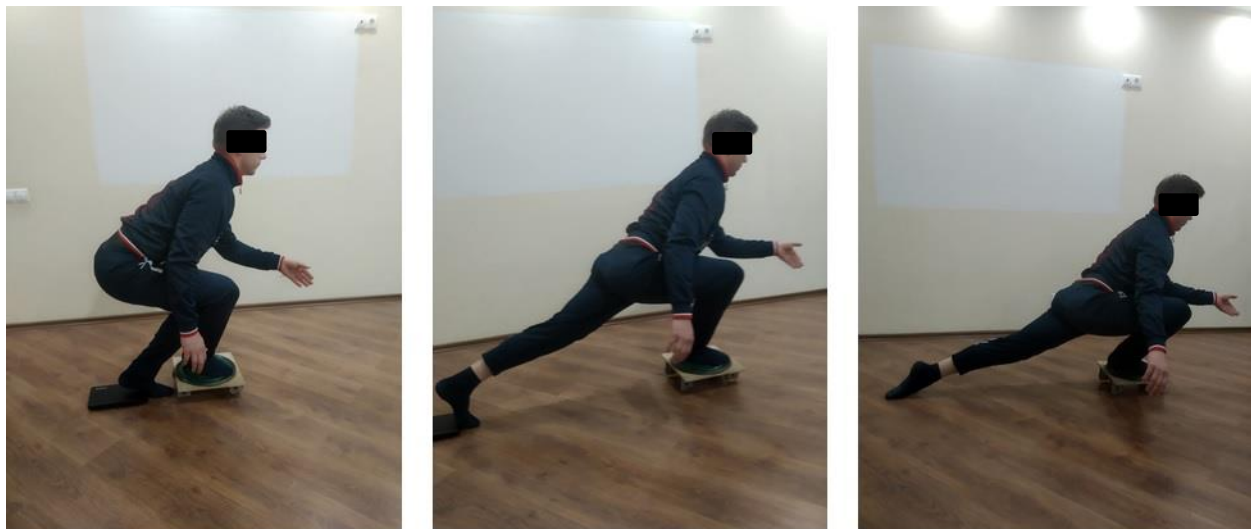


Figure 3. Pushing oneself off the gym machine.

The gym machine consists of a flat platform, two pairs of rollers, and a horizontal bearing. Its special feature is that on its square flat base four rollers are fixed in the corners, on an individual shaft each, with radial

bearings on two parallel lines. In the geometric centre of the platform and between the centres of the vertical shafts of the roller wheels the flat horizontal bearing.

Using the experimental method and scientific statistics method during the simulated training the optimal distances of sliding up to full stop on the rigid floor covered with linoleum with different types of throws were found. For example, if an athlete during competitions must make a draw, he needs to slide with the speed of 7.8 km an hour after pushing off, while during simulating trainings in a gym he must slide 3.6 meters until the full stop to repeat the same effort. And so on. The index numbers for other types of throws are presented in the Table 1.

Table 1. Optimal distances of sliding up to full stop on the rigid floor covered with linoleum with different types of throws.

Type of throw	The speed of the stone sliding during the outrun. km/h (competitions conditions)	The sliding distance in meters during exercise using the training roller platform on a rigid floor covered with linoleum.
Further guard	7	2.8
Middle east guard	7.4	3.2
Draw	7.8	3.6
Slow take out	8.2	4
Middle take out	9.8	5
Hurry take out	10.5	5.5

As a result of the above work, we applied for a patent (Galaiko and Groshev, 2021) (Figure 4).

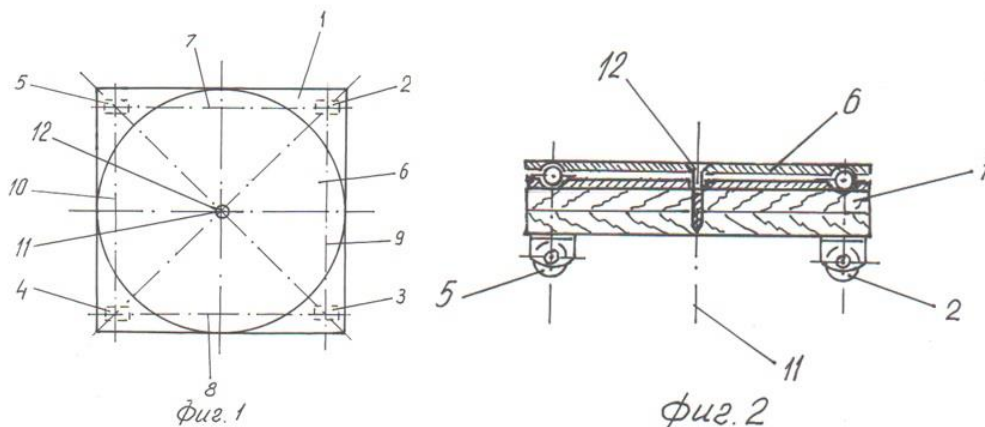


Figure 4. Training roller platform for curlers boot.

The release of the stone by one's hand is also an important element influencing the exactness of a draw. On releasing a stone, it is necessary to make it spin in a clockwise or counter clockwise manner. The intensity of spinning influences the trajectory, so it is important to know how to release the stone with the right number of rotations. On releasing the stone, it is important to correct the trajectory of its movement along the line. It is also possible to correct the speed of the stone releasing it slightly or by giving it an impulse. All these elements of techniques can be improved with the help of the second gym machine.

The training roller platform for curling stones throwing differs from the first one in the fact that the curling stone is placed and fixed in the centre of it. This device can be used during training to improve an athlete's grip of the stone. (See figure 5 for examples of gripping a stone).



Figure 5. Examples of gripping a stone.

This machine is as well used for training and improving the force of stone release and the intensity of its rotation (Figure 6). This equipment enables the repetition of technically appropriate movements that mimic the technique of throwing curling stones.



Figure 6. Training and improving the force of stone release and the intensity of its rotation.

A further patent was applied for and received (Galaiko and Groshev, 2021b). (Figure 7).

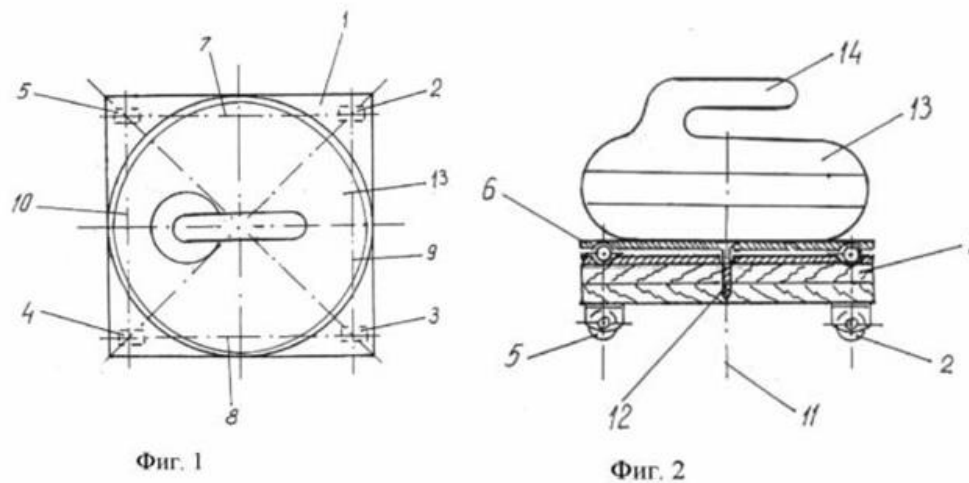


Figure 7. Training roller skate ground for throwing a curling stone.

As a result of both patented developments, conditions were created that enabled athletes to practice technical components of stone delivery, as well as train to improve and control take-off forces.

## DISCUSSION

The economical effectiveness of the gym machines usage during the training process is proved by the fact that in the preparation period of the annual cycle before the start of the competitions season (it is July, August, or September) it is possible to have efficient preparation without financial expenses for construction, maintenance and rent of the specialized ice venues. The training process can be organized in a usual fitness gym with linoleum, parquet or laminated flooring. The equipment has aided Krasnoyarsk athletes to improve both the quality and the intensity of their technical preparation. This has been important as the machines have aided efficiency in the use of time, while developing and training technique and competitive actions.

## CONCLUSION

We have used the gym machines during the training in the “Ice Sports School” in Krasnoyarsk. They have been used by the players of the Krasnoyarsk Regional team and players of the National team of Russia since 2018.

The award-winning places and victories at regional and Russian competitions of the athletes after using these machines prove the efficiency of this invention.

## AUTHOR CONTRIBUTIONS

All authors noted below have contributed to this paper through original research and throughout the writing process. Professor Aleksandr Bliznevskiy. Assistant professor Vasilij Groshev. Assistant professor Natalya Soboleva.

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## DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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