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Innovations in the Design of Shoes Type Boots

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ABSTRACT: The article analyzes the designs and production technology of safety footwear such as shoe covers. The characteristics of protective shoe covers and shoe covers for bogies, properties, purpose, manufacturing methods and requirements for protective safety shoes such as shoe covers have been determined. The requirements for promising special footwear, such as shoe covers for military personnel, made using a special technology and using effective components that provide comfortable conditions for wearing shoes during long-term use of shoes at low temperatures, have been determined.

KEY WORDS: safety footwear, comfort, design, shoe covers, technology, materials, properties, protective properties, manufacturing method, purpose, requirements, protective covers.

I. INTRODUCTION

Shoe covers have long been an integral part of our life. Protective covers - shoe covers mankind has used throughout almost all of its history. All over the world, they had a different name, shape and scope.

Distinguish: shoe covers - bogs and protective shoe covers.

Shoe covers, wanderers, bogs - boots with very long tops that cover the hips. Designed for long-term use of footwear in low temperatures, for walking in swamps, water, etc. [1].

Protective shoe covers - Covers or protective stockings worn over shoes. They are mainly used for hygienic purposes, to keep the premises clean from street dirt; are included in the set of suits for chemical and radiation protection [2].

Despite the impressive history, shoe covers (as we are used to seeing them) were created by our recent ancestors. The effectiveness of this invention has been appreciated by medical professionals around the world. Therefore, it is not surprising that the use of disposable shoe covers in private or public hospitals is no longer a whim, but a mandatory requirement.

Protective shoe covers function as cleanliness protectors, prevent the ingress of dirt, pathogenic microflora and allergens carried on the soles of shoes. They can also be used to solve another problem: to protect the legs of a person in crowded places where it becomes necessary to take off shoes, which is unsafe from the point of view of hygiene. To effectively perform these tasks, shoe covers must be sufficiently durable and of high quality.

II. ANALYTICAL RESEARCH

Disposable shoe covers of the structure of the material distinguish between smooth and textured. With an equal thickness of the material, the former are more durable, while the latter are less slippery. [3]

According to the material of manufacture, protective shoe covers are:

- made of low pressure polyethylene (HDPE);
- high pressure polyethylene (LDPE);
- chloropolyethylene, which is a mixture of HDPE and LDPE with various additives.

According to the manufacturing method, shoe covers can be:

- a) machine-made. In them, the gum consists of two welded using spunbond (non-woven fabric) halves.
- b) handmade (with a solid elastic band). They practically the possibility of rupture of the elastic is excluded.



Figure 1. Protective shoe covers.

- a) hand-made shoe covers; b) machine-made shoe covers;
- v) protective shoe covers from moisture; g) protective shoe covers from dirt.

Protective shoe covers are available in sizes 13×18 cm, less often - 15×40 cm. Due to the elastic band, the shoe covers hold equally well on both shoe size 20 and size 46. In terms of density, shoe covers can be dense (42 g / m^2) and low density ($20\text{-}25 \text{ g / m}^2$).

In many ways, the quality of shoe covers depends on the raw materials used in production, the method of soldering and the elasticity of the elastic bands. Depending on the class of the product, shoe covers can be used for different periods of time (from 5 minutes to 5 hours). The most reliable shoe covers are of increased strength, intended for medical institutions. They can have grooved or laminated soles. The thickness of the polyethylene wall ranges from 25 to 45 microns, and, according to the manufacturers, such models of shoe covers can be used for 4-5 hours and even more than once. [4]

High-quality shoe covers are made from materials that are resistant to external influences - acid, moisture, alkali. Another indicator is wear resistance. It is important that the products are strong when stretched and do not wear out.

Protective covers - shoe covers at different times had different names:

- Watara - fishing shoe covers.
- Gutuls - rough covers with thick soles.
- Butuly - the peasant's rough footwear.
- Charki - Siberian casual shoes.
- Luntai - covers made of animal skins and hair.
- Ichig - Asian ankle boots without a sole.
- Tarbases - Kamchatka protective covers.

Boot covers - covers or protective stockings worn on top of shoes. They are mainly used for hygienic purposes, to keep the premises clean from street dirt. They are used in medical institutions, in the premises of very clean industries, in museums, etc. There are different designs, materials and colors. Most often they are disposable, but there are also reusable ones (for example, reusable shoe covers made of thick soft fabric are used in museums to preserve valuable parquet floors). Also, reusable fabric shoe covers are used by medical personnel in operating rooms, put on clean shoes, and after use are disinfected by auto-tacking [5].

There is also a separate category of shoe covers that are used outdoors. They are used in hiking trips and cycling. Typically, these products are made of rubber or plastic. They protect your feet from dirt, sand and moisture.

Several centuries ago, shoe covers were used a little differently for the purpose for which we use them today. Yes, and they looked completely different. Initially in Russia, the peasants called shoe covers any shoes that were intended only for work, but not suitable for walking. These shoes were long leather boots or ankle boots made of woven or woven material, which were pulled together by straps. Shoes made of a single piece of leather were especially durable and waterproof - they were preferred by hunters and fishermen [6].

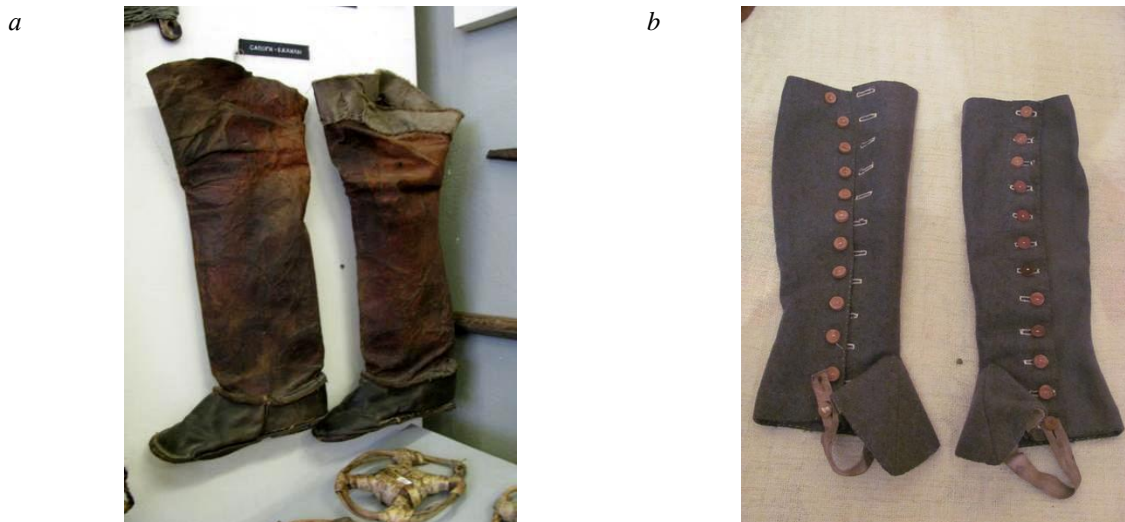


Figure 2. Shoe covers in antiquity.
a) shoe covers - leather boots (bogies); b) strap shoe covers

In medieval France, items similar to shoe covers were worn in royal palaces. Due to this, they ensured the cleanliness of parquet and expensive carpets. Of course, in appearance they were very different from disposable shoe covers. These were special covers that were made of fabric or leather. [7]

But not only France could boast of covers that look like modern shoe covers. Similar shoes were worn in Kievan Rus, however, already for the holidays. She was a low boots with thin soles. These shoes were made from braided or woven material. And they put it right on their bare leg.

Travelers also used protective shoe covers. These were people with a fairly large income who wanted to ensure the safety of their expensive shoes. Over boots or sandals, they wore something like shoe covers to protect them from dust, dirt, stones, etc. [8].

Most of the peoples of Central Asia used shoe covers-ichigi (makhsi) - men's and women's shoes, high unlined boots made of soft leather, which were worn with leather galoshes - kaushi. Kaushi - shoes with a one-piece vamp with lowered ankle boots, on a leather sole with a nail fastening method. [9]



Figure 3. Construction of shoe-ichigi (mahsi)

a) shoe covers - chigi; b) kaushi; v) mahsi

Ichigi made of colored morocco with soft soles (then they are worn with leather galoshes) are common among a part of the Russian population of Siberia, Tatars, Bashkirs and some peoples of the Caucasus (for example, among the Asetins) [10].

Significant changes have taken place in the design of protective footwear for military personnel. For two centuries, law enforcement officers used tarpaulin boots with footcloths, which protected the foot from both the cold and dirt. By design, kersey boots also belong to the varieties of protective shoe covers.

Wearing high shoe covers in the Far North, made of thick tarpaulin, over warm winter shoes, prevented snow from getting inside (when moving on virgin snow). The leg remained dry [11].

Winter protective overshoes should not only protect the feet from low temperatures, keeping warm, but also have excellent protective properties. An important property of winter safety footwear is its ability to "breathe".

Human skin emits a certain amount of water vapor. When a person is in the cold, water vapor diffuses through the wall of the shoe, followed by condensation. Condensation occurs, as a rule, in the thickness of the material from which the shoes are made. By wearing canvas shoe covers that do not fit tightly to winter shoes (boots, high fur boots, felt boots), hunters shift the condensation point closer to the outer surface of the material (or even beyond the material). Shoes do not freeze and remain dry, just take off the shoe covers and shake out the frost.

At present, the most promising are the designs of special shoes such as shoe covers made using a special technology and using effective components that provide comfortable conditions for wearing shoes during long-term use of shoes at low temperatures [12].

Figure 4. Shoe covers "galoshes" with an insert.



The liner for overshoes is made of soft fur using natural wool (at least 50%), duplicated with a dense foil cloth with natural flax fibers, therefore it perfectly retains heat and maintains a comfortable temperature regime even in severe frosts. In addition, the heel part of the liner is additionally reinforced with a Vinitol insert.

Shoe covers are made of durable TEP material, which is particularly frost-resistant. Thanks to the durable and comfortable lacing, the shoe covers are tightly fixed on the leg, eliminating discomfort when walking. A blind flap prevents moisture and other objects from getting inside the shoe. Operating temperature minus 30-40 0C.

III. CONCLUSION

The analysis of shoe-type shoe designs, produced in various countries of the world, made it possible to conclude that the assortment and designs of safety shoes have changed dramatically and increased compared to 1890-1990. The requirements and the scope of application of footwear such as shoe covers have increased, the range of component materials has increased. New designs of safety footwear such as shoe covers are produced using highly efficient components and innovative technologies.

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