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Individual Project 1

Redesigning the Drinking Water Fountain

It is critical for health to stay hydrated, and the easiest way to stay hydrated is to drink water. This water can come from water bottles, cups, or drinking water fountains, but all these methods have drawbacks. Water bottles are heavy and inconvenient to carry. Plus, they must be constantly refilled. Requesting a cup of water is also inconvenient, and worse, it is wasteful. If the cup cannot be reused, its existence is detrimental to the planet, and if it can be reused, it must be cleaned, which requires more water. Drinking water fountains are more convenient, but they are not efficient. One does not gulp water from a fountain; one sips. Next time you use a drinking water fountain, take notice of all the water flowing down the drain. That water is not immediately cycled back through the fountain, because it has been contaminated by your mouth—that water is wasted. If only there were a way to redesign the drinking water fountain, so it could be both convenient and efficient.

I propose a new type of drinking water fountain that is not a fountain at all, but rather, a tube. The tube is connected to a water supply above the user's head and hangs down to within the user's reach. The tube is flexible, so users of any height can use the tube by bending it to fit their needs. At the base of the tube is a valve that users turn to control the water flow. For sanitary reasons, the users do not touch the tube with their mouths. When the users are finished using the tube, they turn the valve in the opposite direction to cut the water flow, and then they release the tube. It is simple, convenient, and efficient.

If the solution is so simple, surely someone else has thought of it. To my surprise, I did not find a similar idea in my search on the US Patent Office database. I did, however, find two different patented products that provided useful information for my own design. First, I found a drinking water fountain with an adjustable height (Vandergriff, 2013; see Appendix B). This redesign reminded me that the original design is not easily accessible to users of varying heights and abilities, and it encouraged me to ensure that my own design would be adjustable to fit these users' needs. Second, I

found a multiple-person drinking water fountain that consisted of a U-shaped tube with strategically placed holes for different users (VanDegrift, 1998; see Appendix C). Although this design also incorporated a tube, the problems of wasted waster and only being able to take sips remained. However, this design prompted me to consider the idea of including multiple tubes in my design to account for multiple thirsty users.

Next, I looked at Human Factors design standards to inform my redesign. For example, Public Law 112-28 from the Consumer Product Safety Improvement Act (CPSIA), contained information on lead content limits and exceptions from those limits (Regulations, Laws & Standards, 2017). This standard is relevant to my design because lead can often be found in water, and lead-contaminated water threatens the consumer's safety. Additionally, since the drinking water fountain to be redesigned uses water from a public water system, as opposed to water from a private well, my product is not exempt from these standards (Background on Drinking Water Standards in the Safe Drinking Water Act (SDWA), 2017). In order to ensure that lead content is within an acceptable range, the drinking water tube will include a filter and lead tester. If the filter fails and the water no longer passes the lead test, a light on the water supply container will turn from green to red. Beside the light will be a warning placard to notify the user that the red light indicates that the water does not meet safety standards. The placard will also feature the number of a maintenance crew in the area that can come to fix the filter. This feedback seems to be lacking from the current drinking water fountain design, yet it seems to be worth including.

Another important design standard to take into account is the Child Safety Protection Act (CSPA). The CSPA is a provision of the Federal Hazardous Substances Act dedicated to protecting small children from choking hazards (Regulations, Laws & Standards, 2017). In the initial design of my product, I pictured the nozzle of the tube as detachable, so it could be frequently removed and cleaned. However, if this removable nozzle poses a choking hazard for small children, it is worth reconsidering. One option would be to include a warning label, reporting the potential choking hazard. Another option would be to redesign the nozzle so it is too large to be swallowed and/or is no longer detachable by just any user. I prefer the redesign.

Finally, I researched two journal articles to further develop my design. The first article studied student consumption of water at 24 California Bay Area public schools (Patel, Chandran, Hampton, Hecht, Grumbach, Kimura, Braff-Guajardo, & Brindis, 2012). The researchers noticed a positive correlation between the number of students who were drinking water and the schools with non-fountain sources of water. They speculated that students preferred non-fountain sources of water because the drinking water fountains were broken, dirty (e.g., some fountain basins contained gum or dirt), and only permitted small sips. These problems emphasize the importance of having a valve to control water pressure and not having a water basin in the fountain redesign.

The second article focused more in depth on student consumption of water at 9 California middle schools (Patel, Bogart, Klein, Cowgill, Uyeda, Hawes-Dawson, & Schuster, 2014). Instead of mere observation, researchers conducted surveys amongst 3,211 students. Their results revealed that 59% of students thought the school fountains were unclean, 48% thought the water did not taste good, 33% feared that the fountains could make them sick, and 24% feared that the fountain water was contaminated. Coincidentally, I did not take any of these concerns into account when I decided to redesign the drinking water fountain. My focus was on water conservation. After reading this article, a new priority emerged: water quality. By emphasizing the new design's cleanliness throughout the product, beyond just a green safety light, my design can help students feel safer drinking water. This would not be a concern had I not read this article.

With help from patents, Human Factors standards, and journal articles, my simple tube accumulated new design features, requirements, and a new purpose. Eight of these human factors requirements are the following:

1. Tube connects to water supply above user's head and hangs down to within user's reach
2. Tube is made with flexible material so height is adjustable
3. Option to append multiple tubes for multiple simultaneous users is available
4. Tube consists of a valve that can be turned to control the water flow; valve is easy to manipulate for users of all abilities

5. Nozzle is firmly attached to tube and too large to be swallowed if detached
6. Water supply includes filter and lead tester
7. Light and placard on water supply indicate safety of drinking water and a number for maintenance/assistance if necessary
8. Overall design emphasizes water quality and cleanliness

This design is simple and efficient. Its implementation means fewer water bottles strain the arms of their carriers; fewer cups end up in landfills or dishwashers; fewer sips are taken—they are replaced with gulps. Less water is wasted, and more water is consumed. The health of the planet and the users is improved. The more I think about it, the more I wonder why no one else has thought it first.

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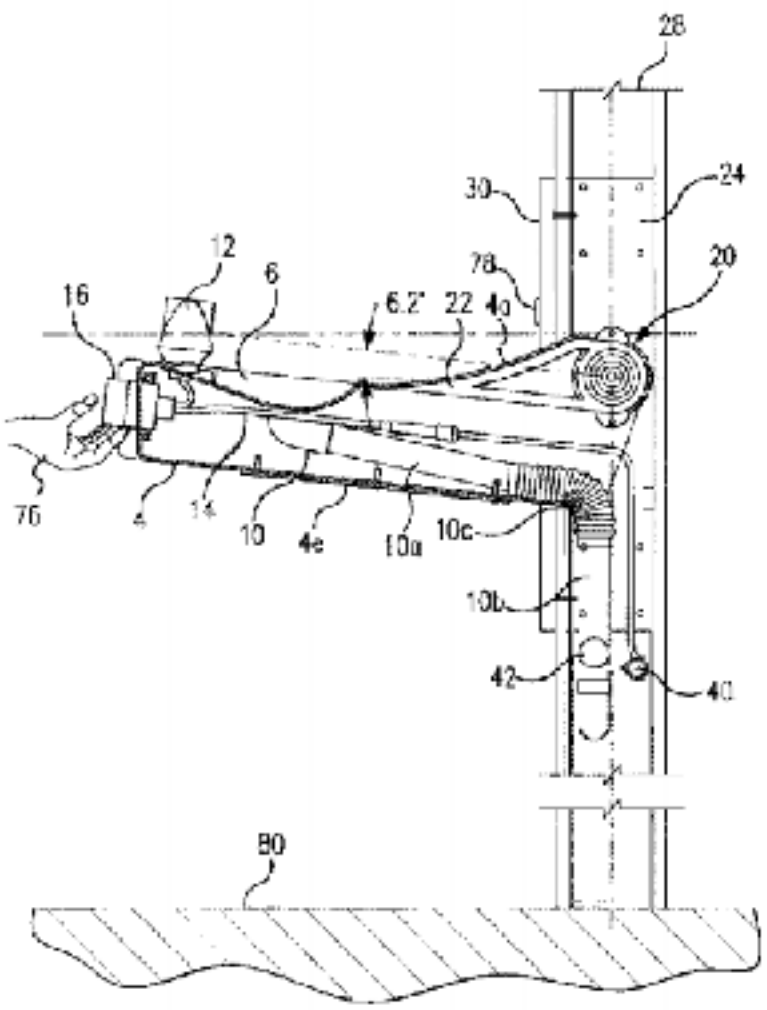
Appendix A

Appendix B



Appendix C