

P2 Project Report

Redesign of Idiyappam Maker for User-Friendly Culinary Experience

Guided by
Prof. Purba Joshi

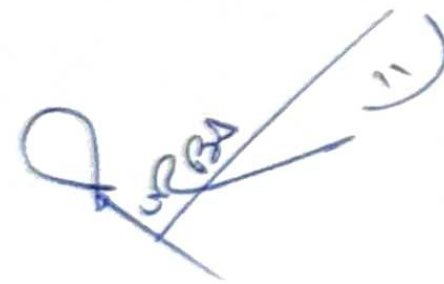
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Approval Form

Industrial Project II

This is to certify that the Industrial Design Project entitled “Redesign of Idiyappam Maker for User-Friendly Culinary Experience” by Wasim Salih Thari is approved for partial fulfillment for the Master of Design degree of Industrial Design at IDC, Indian Institute of Technology, Bombay.

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(Project Guide)



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Declaration Form

I, declare that this written report represents my ideas in my own words, and where other's ideas or words have been included I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not falsified, misinterpreted or fabricated any idea, data, facts or source in my submission. I understand that any violation of the above will be caused for disciplinary action by the Institute and can also evoke penal action from the source, from which proper permission has not been taken or improperly been cited.

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Acknowledgement

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Abstract

This industrial design project endeavors to transform the conventional idiyappam maker, addressing current usability challenges and enhancing the overall user experience. Through a comprehensive exploration of user requirements and preferences, the project prioritizes refining essential design elements, including mechanism efficiency, stability, and seamless dough feeding, aiming to streamline the idiyappam-making process. Innovative features such as body weight assistance and controlled use of mechanical stored energy are incorporated into the redesigned idiyappam maker, aiming to minimize user effort, alleviate fatigue, and introduce a more enjoyable and efficient culinary experience. Valuable insights obtained from user interviews and usability testing guide the development of design concepts, with a specific focus on creating a versatile and accessible kitchen tool tailored for South Indian households. This project represents a significant advancement in improving the usability, comfort, and functionality of the idiyappam maker, contributing to the evolution of traditional culinary tools through meticulous industrial design.

Introduction

Idiyappam is a traditional South Indian breakfast dish that has a rich history and cultural significance. It is a staple food in the southern states of Tamil Nadu and Kerala, and is believed to have originated in the Chera dynasty in the 1st century AD. The dish was later adopted by the Chola and Pandya dynasties, and has been passed down through generations.

Idiyappam is made by pressing rice flour dough through a sieve to form thin, string-like noodles, which are then steamed to perfection. The dish is known for its delicate texture and subtle flavor, and is often served with a variety of accompaniments such as coconut chutney, curry, or stew.

Over time, idiyappam has become a popular breakfast dish in South India, and is enjoyed by people of all ages. It is often prepared during special occasions and festivals, and is considered a comfort food by many. In recent years, idiyappam has gained popularity outside of South India, and can now be found in restaurants and homes across India and around the world.

In this industrial design project, we aim to create an innovative and user-friendly idiyappam maker that simplifies the process of making idiyappam at home. Our goal is to preserve the traditional methods of making idiyappam, while incorporating modern design principles to enhance the user experience and make it accessible to a wider audience.



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Idiyappam - A journey through history

South Indian rice and coconut-based dishes – appam, idiyappam (also called noolputtu), and puttu go a very long way in history. They were very popular in ancient Tamil literary (which included Tamil Nadu, Kerala, and parts of Karnataka). Both idiyappam and puttu were steam cooked and appam was cooked in a clay or iron pot with a curved bottom over a wood burning stove. According to eminent Indian food historian K.T. Achaya both idiyappam and appam were dishes sold by kaazhiyar and kuuviyar – vendors of snack foods – on the seashore; they are graphically described in ancient Sangam poems (dating back to a period from 300 BC to 300 AD.)

Idiyappam, fresh steam cooked fine rice noodles, were traditionally made by soaking and grinding rice into a very fine batter. This batter is mixed with salt and a tablespoon of oil and cooked over a stove to remove all the water. It is stirred constantly while cooking so that no lumps form. After a few minutes of cooking the batter thickens and comes together into a ball of soft dough, it is cooled and then filled in a wooden or metal press with many small holes at the bottom. The noodles are squeezed out in a circular pattern on to a steamer plate with tiny holes at the bottom lined with clean wet cloth and steamed for five to six minutes. Alternately the soft, cooked dough is steamed first and then the noodles are squeezed out using the press.



<https://en.wikipedia.org/wiki/Idiyappam>



<https://www.ebay.com/itm/203227306503>



<https://www.nithaskitchen.com/2013/11/idiyappam-santhagai.html>



<https://www.ebay.com/itm/185960786301>

The food culture

South Indian breakfasts have a long and fascinating history that is closely tied to the region's culture and traditions. These breakfasts were originally meant to provide sustenance for farmers and workers who needed a hearty meal to start their day. Over time, these breakfasts became an integral part of South Indian cuisine and were served in homes and restaurants across the region.

The cuisine of Southern India is extremely diverse and is well-known for its light, low-calorie appetizing meals. Southern India has a hot, humid climate and all its states are coastal. Rainfall is abundant and so is the supply of fresh fruit, vegetables, and rice. No South Indian meal is complete without rice in some form or other. It's either boiled rice or Idlis, dosas, or uttapams.

Apart from their unique taste and flavour, these ingredients like curry leaves, coconut, tamarind, semolina etc. also have cultural significance in South Indian cuisine. They are used in various festivals and rituals to symbolize prosperity, health and happiness.

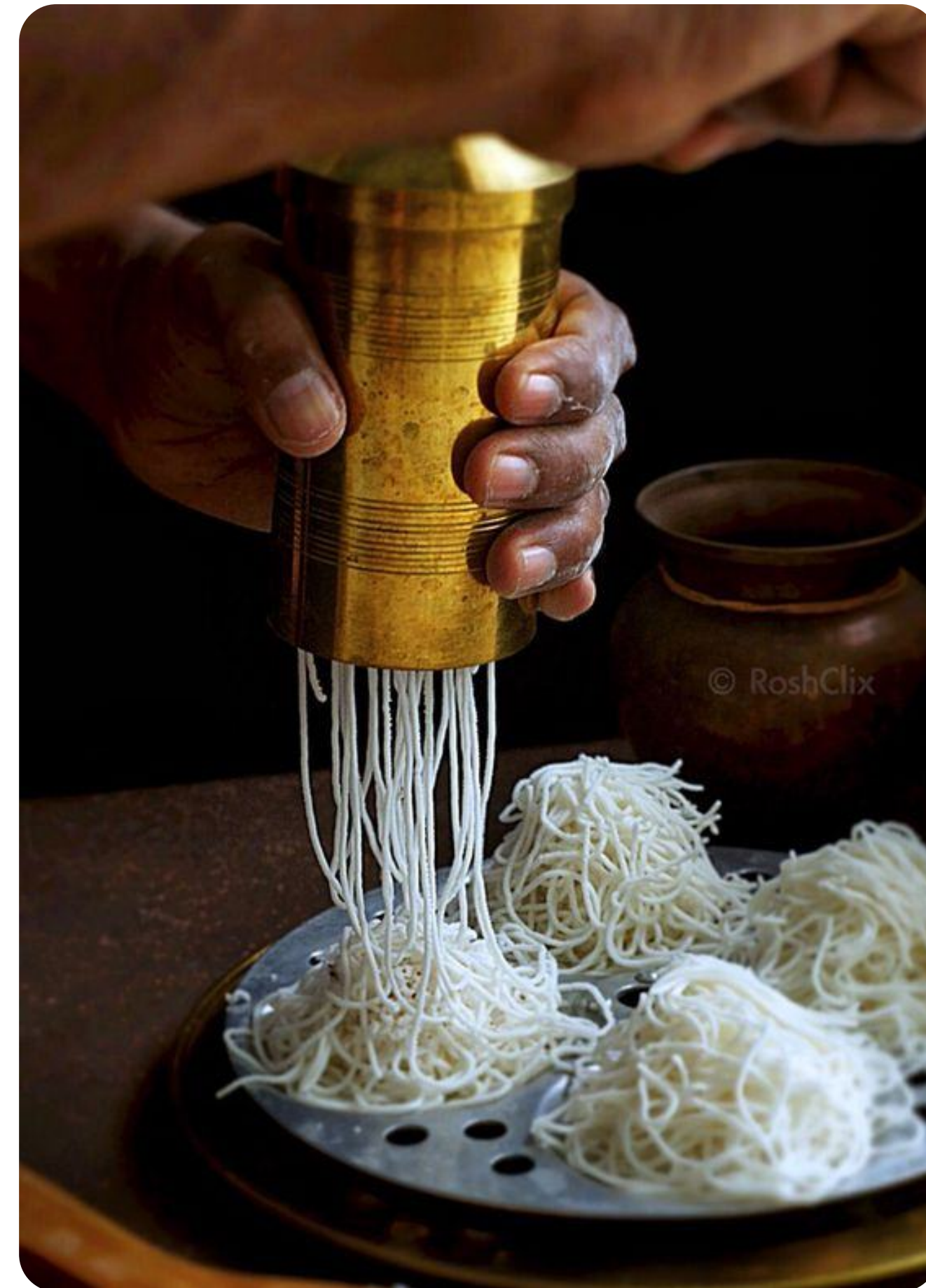


<https://www.vogue.com/article/must-eat-dishes-from-south-india>

Problem statement

Making Idiyappam using the current methods is highly inconvenient. The process involves applying significant force, and the product's design often results in user injuries.

Witnessing my mother preparing idiyappam for breakfast at home has revealed the challenges she faces in using the existing product, causing discomfort and pain in her hands. Often, she hesitates to cook idiyappam, opting for alternative dishes due to the perceived effort and time required for its preparation. On occasions when strength is essential, she even seeks assistance, emphasizing the need for a more user-friendly and enjoyable approach to idiyappam making. This observation has sparked the idea that there must be an improved and more convenient way to make idiyappam, enhancing the overall ease and enjoyment of the process.



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Design Objective

To improve the idiyappam maker's user experience by minimizing the necessary force and optimizing its design for enhanced user comfort, incorporating thoughtful considerations for user-friendly design practices.



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Context



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ENVIRONMENT

KITCHEN
-Used for breakfast
once a week



CATEGORY

Kitchen Appliance



USER

Age group: 30-60



ACTIONS

Cooking, Cleaning,
Storing, Assembly and
dismantle

User interview



Anita

42



Suhrabi

55



Mohyudhin

44



Reshma

34



Geethu

47

- Users report experiencing hand discomfort after continuous use of traditional wooden idiyappam makers.
- The adoption of alternative mechanisms, such as a gun-type idiyappam maker or a rotating version, indicates a diversity of preferences among users.
- Participants specifically use the idiyappam maker for preparing idiyappam and do not utilize it for other food items, showcasing its specialized role in their culinary routines.
- The majority of users typically make idiyappam 1-2 times per week.
- Cleaning the idiyappam maker is consistently highlighted as a challenging aspect, pointing to a potential area for improvement in terms of design or materials.
- Participants express a need for a higher volume capacity in the idiyappam maker, emphasizing a desire for increased efficiency and convenience, particularly when preparing larger quantities.
- Insights gathered from user interviews underscore the importance of considering comfort, ease of use, and maintenance aspects in the redesign or improvement of the idiyappam maker.

How it is made



<http://www.flavorsofmumbai.com/idiyappam-recipe/>

MAKE DOUGH

FILL INSIDE IDIYAPPAM MAKER

MOULD TO NOODLE SHAPE

STEAM COOK

Roleplay



Initially, my attempts at making idiyappam were guided by my mother at home. I observed her carefully as she went through the entire process, from preparing the dough to cooking the finished product, and even cleaning the utensils. As I practiced, I gradually learned how to make idiyappam myself, paying attention to every stage of the process, as each step was crucial for achieving the desired result.

Market Study



<http://www.flavorsofmumbai.com/idiyappam-recipe/>

There are three major idiyappam makers used in Indian household. All of them function by extruding the dough through a channel to create noodle shapes. These products are made from various materials, ranging from wood to steel, with some featuring a copper coating to add a touch of tradition.

The first product operates by applying direct pressure to the dough, making it the most traditional option among the three. However, it can cause hand fatigue, leading to a decline in its popularity.

The second product incorporates a more mechanical design, gradually pushing the dough through the channel with each press of the handle. It can be used with one hand, but it is the least favored among Indian users.

The third product transforms rotational motion into linear motion, reducing the effort required from the hands. It requires two hands to operate and maintaining its stability during use can be challenging.

Comparison of existing products



<http://www.flavorsofmumbai.com/idiyappam-recipe/>

- Applying direct pressure to the dough is extremely challenging.
 - The palm can become injured and tired quickly when using the device.
 - Opening and refilling the device is comparatively easy.
 - The device requires the use of both hands; uneven pressure can lead to destabilization.
 - Four idiyappam can be made with one fill.
- Relatively easy to stabilize.
 - The hand pressing the lever is subjected to a higher load.
 - Opening and refilling the device is a time-consuming process.
 - Operation requires the use of both hands.
 - A small portion of dough remains unpressed.
 - The device can produce three idiyappam with one fill.
- Stabilizing the device while rotating the lever is extremely challenging.
 - The hand holding the product experiences a higher load.
 - Opening and refilling the device is time-consuming.
 - The device requires two hands to operate.
 - A significant amount of dough remains unpressed.
 - The device can produce five idiyappam with one fill.

Different food made from similar device



Chakli



Sewai



Fried snacks



Noodles

Similar Products around the world



Known as **putu mayang** in Indonesia, idiyappams are served with flavoursome chicken curries or spicy meat preparations. As the dish travelled further from the land of its origins, the idiyappam evolved into being a recipe that was also made with tapioca flour, pumpkin squash, yams and pandan extract.



Steamed rice noodles are called **putu mayam** in Malaysia. It is made freshly ground rice flour. The flour is then either steamed or roasted. Then the flour is mixed with water and salt into a thick paste. Sometimes water infused with pandanus leaves is used to make the thick paste. It imparts green color and fragrance to the rice mix. It is then pressed through a wooden press which has holes at the bottom, creating long, stringy noodles.

Similar Products around the world



Ramen noodles - Japan



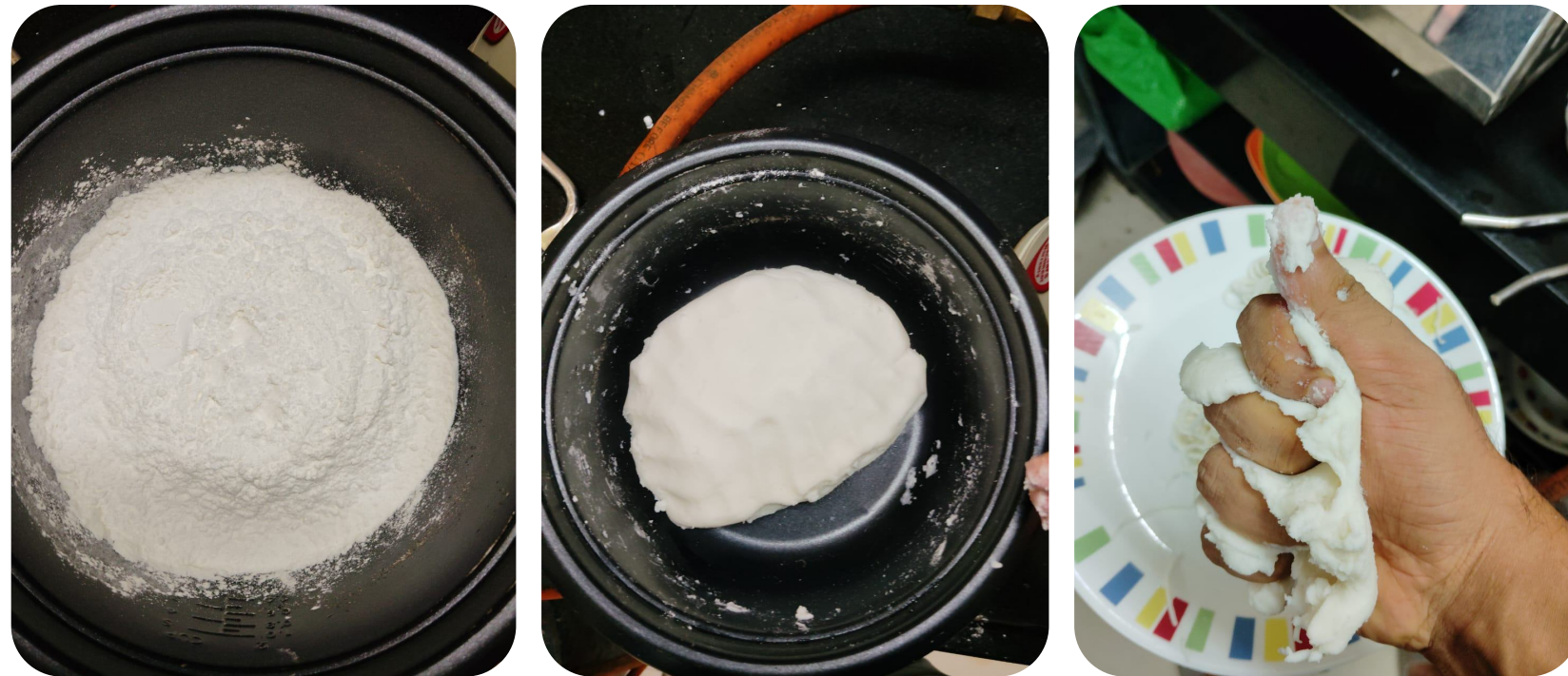
Noodle soup in Vietnam



Cookies - Western countries

In different regions around the world, there are variations of the idiyappam dish, as well as products that operate on a similar principle to the idiyappam maker. During this stage of the project, I took the time to explore and study these variations, drawing inspiration from the different products and dishes I encountered. It is essential to have a thorough understanding of the context in which my product will be used, as well as the specific needs and preferences of its users, in order to successfully move forward with the project and create a product that meets those needs.

Cooking experimentations



Utilizing the pantry facilities at IDC, I embarked on the task of preparing idiyappam. The initial challenge lay in independently executing the entire process, from taking flour to mixing it with hot water and achieving the right consistency for the dough without my mother's assistance. This crucial step significantly influences the ultimate taste of the idiyappam. The mastery of creating delightful idiyappam lies solely in the combination of experience and a thoroughly practiced recipe.

My mother imparted a valuable tip on assessing the dough consistency. Taking a handful of dough, squeezing it, the texture should allow it to run through your fingers just enough without breaking apart. If it breaks apart, there's too much water; if it doesn't flow through the fingers, the water content is too low.



Rotatory idiyppam maker



Rotatory idiyappam maker has a screw mechanism that converts rotatory movements to translational motion.

Rotating the lever on the device proves to be quite challenging due to difficulties in stabilizing it, and the hand holding the product bears a substantial load during operation. The process of opening and refilling the device is time-consuming, further adding to the user's effort and slowing down the overall operation. Operating the device necessitates the use of both hands, making it less user-friendly and potentially cumbersome for individuals who may prefer a more convenient one-handed operation.

Additionally, despite the device's notable capacity to produce five idiyappam with a single fill, a significant portion of the dough remains unpressed after each use. This inefficiency in the pressing mechanism may lead to a wastage of dough and undermines the device's effectiveness in achieving the desired culinary output. Addressing these challenges could significantly enhance the device's usability and efficiency in idiyappam preparation.

Gun idiyappam maker



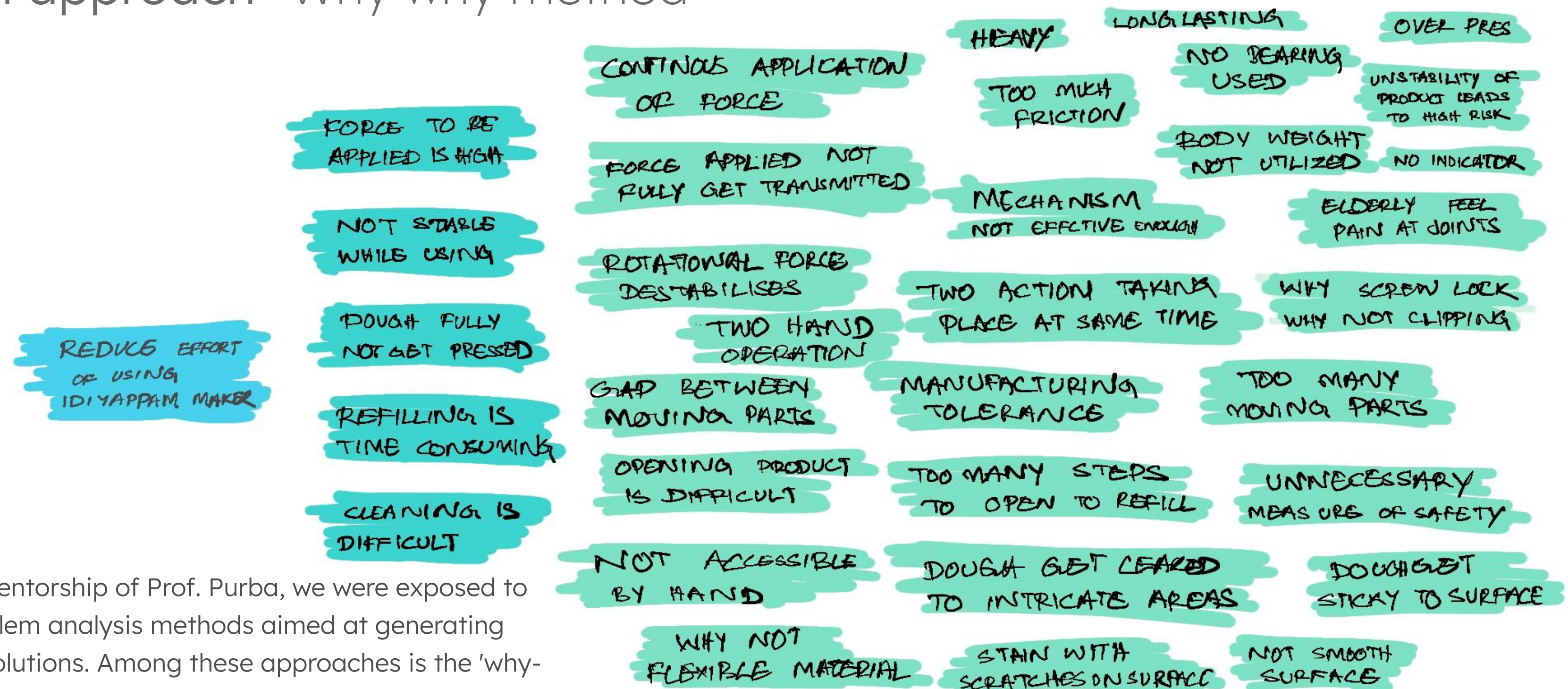
The gun idiyappam maker employs a sophisticated and minimal internal mechanism to incrementally push the dough. This intricately designed system ensures an easy retraction of the lever after pushing the dough, facilitating a convenient and efficient refilling process.

Achieving stability with the device is relatively straightforward, making it easier to handle during operation. However, the hand responsible for pressing the lever experiences a heightened load, potentially causing discomfort or fatigue during extended use. The process of opening and refilling the device is time-consuming, posing an inconvenience to users who seek a more efficient and streamlined experience. Additionally, the requirement for

both hands during operation might limit accessibility and user-friendliness, particularly for individuals who may prefer or require a one-handed operation.

Furthermore, despite the device's capability to produce three idiyappam with a single fill, a small portion of dough consistently remains unpressed after each use. This inefficiency in the pressing mechanism could lead to a waste of ingredients and diminish the overall effectiveness of the device in delivering the desired culinary output. Addressing these aspects, such as optimizing the load distribution on the lever and streamlining the refilling process, could significantly enhance the device's user experience and performance.

Design approach- Why why method



Under the mentorship of Prof. Purba, we were exposed to various problem analysis methods aimed at generating innovative solutions. Among these approaches is the 'why-why method.'

I applied this technique to outline reasons for minimizing the effort required in using an idiyappam maker. By repeatedly asking "why" and simplifying the answers, I gained a comprehensive understanding of the context and identified specific areas to concentrate on for devising effective solutions. This method allowed for a thorough exploration of the problem and guided the focus toward key areas requiring attention.

Design approach- Six thinking men

In this approach, the context is comprehensively examined through the exploration of six fundamental questions: why, what, where, how, who, and when. These questions are posed in both positive and negative formulations to discern elements within the scope of design and those that fall outside of it. This dual questioning process aids in identifying and delineating the factors that should be considered in the design scope as well as those that are deemed irrelevant or beyond the intended focus.

Why do you want to reduce the effort of idiyappam maker

- User would prefer to make idiyappam because it will not be tiring

Why you don't want to reduce the effort of idiyappam maker

- Instant food at table

What is an idiyappam maker with less effort

- Product that convert dough to noodle with minimum load on hands

What is not an idiyappam maker with less effort

- Using the product is tiring and time consuming

Where do you want to use the idiyappam maker

- South Indian kitchen environment

Where do you think it is not suitable to use

- Restaurants and places where high quantity is prepared

How will idiyappam maker will make idiyappam with less effort

- With less physical activity from the user side

How will it not make idiyappam with less effort

- With decreasing the human effort but increasing the time.

Who will use the product

- Those who prefer taste over time

Who will not use the product

- Does not have time to prepare and enjoy the food

When will the product be used

- During breakfast time

When will not it not be used

- Other time of the day

Design approach- Brainstorming



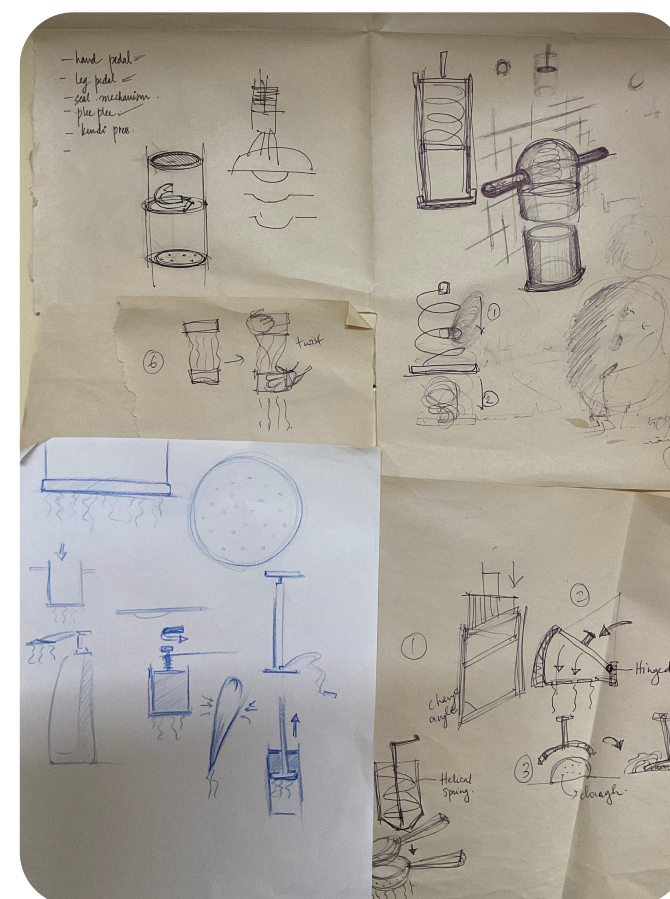
These design approaches provided me with insights into areas that were not initially considered. They offered a thorough understanding of the context and underscored the significance of tailoring designs to specific contexts.

The design focus for the idiyappam maker should be exclusively on the household kitchen environment, with minimal consideration for restaurants or other scenarios. Beyond simplifying the mechanism, prioritizing the stability of the product is crucial for ensuring effortless use by the user.

Streamlining the entire process, including aspects like dough refilling, not only reduces usage time but also contributes positively to user-friendliness. Additionally, attention to details such as cleaning and storage is vital during the ideation phase.

The overarching goal is to ensure that users enjoy the idiyappam-making process rather than perceiving it as a tedious task. This should serve as the guiding brief for moving forward in the design process.

A brainstorming session was organized to broaden the scope of thinking and enhance the problem-solving approach. During this session, ideas were conceptualized, sketched, and compiled into a list. This process proved instrumental in stimulating creative thinking and enabled me to explore diverse directions that had not been previously considered.



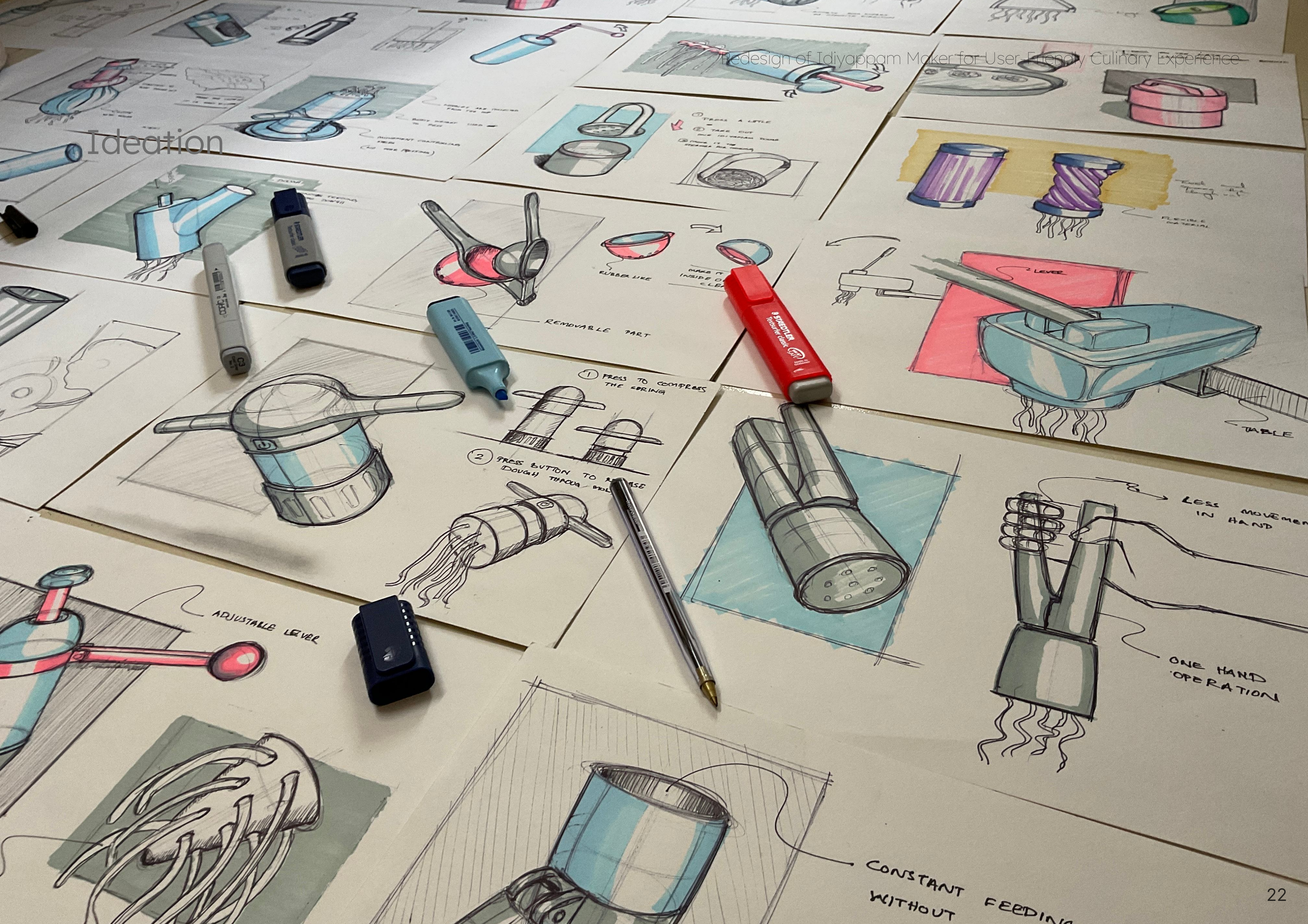
Design Brief

- Redesigned idiyappam maker with reduced force requirement for effortless operation
- Easy-to-clean product for hassle-free maintenance and hygiene
- Ensure the product is comfortable to hold and operate for extended periods, reducing user fatigue.
- Include a clear visual or audible indicator to signal when the Idiyappam maker is fully pressed or when the dough is running low.
- Sustainable design by allowing easy replacement of components like the cloth or dough container to extend the product's life.
- Pay attention to the product's aesthetics to make it visually appealing and suitable for modern Indian kitchen settings.

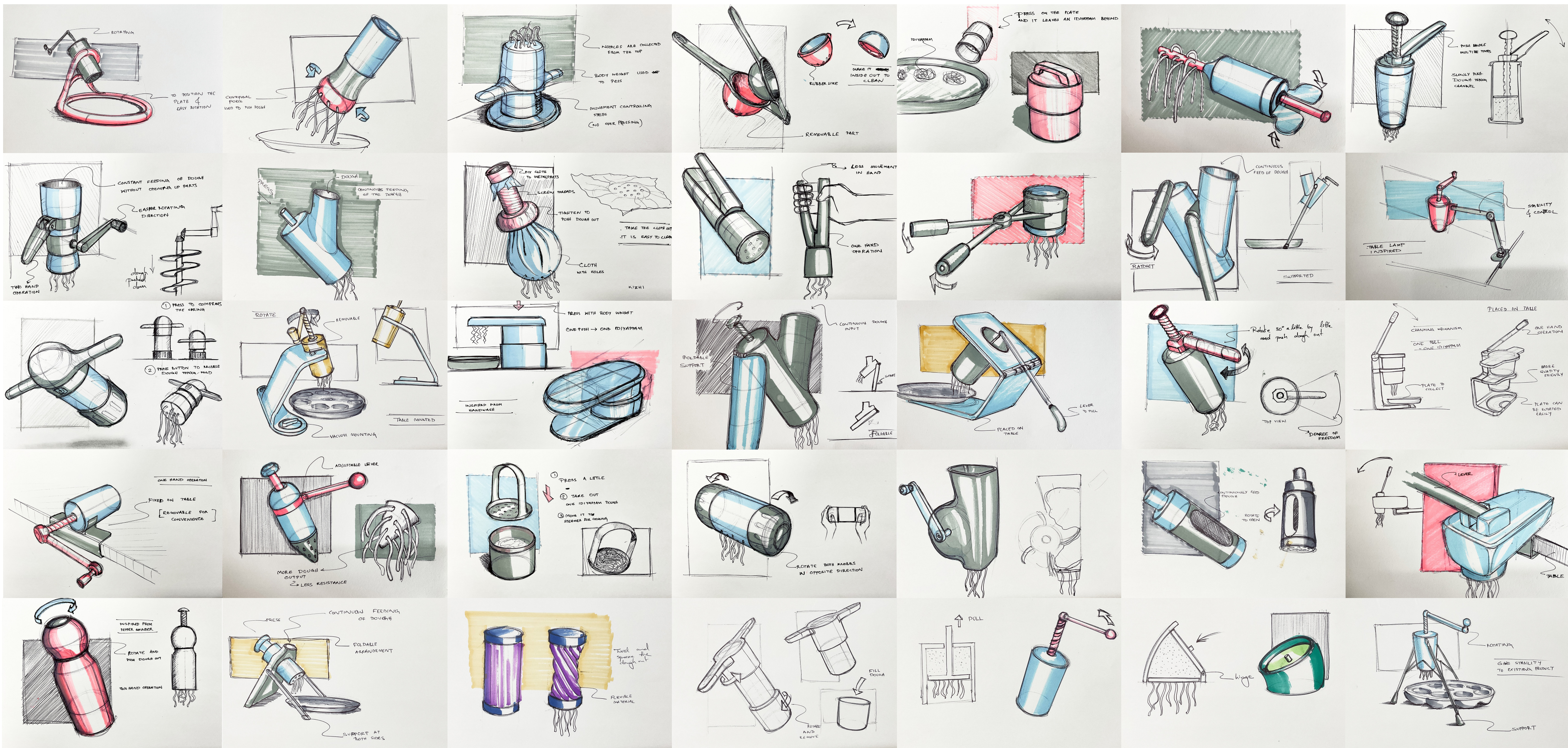


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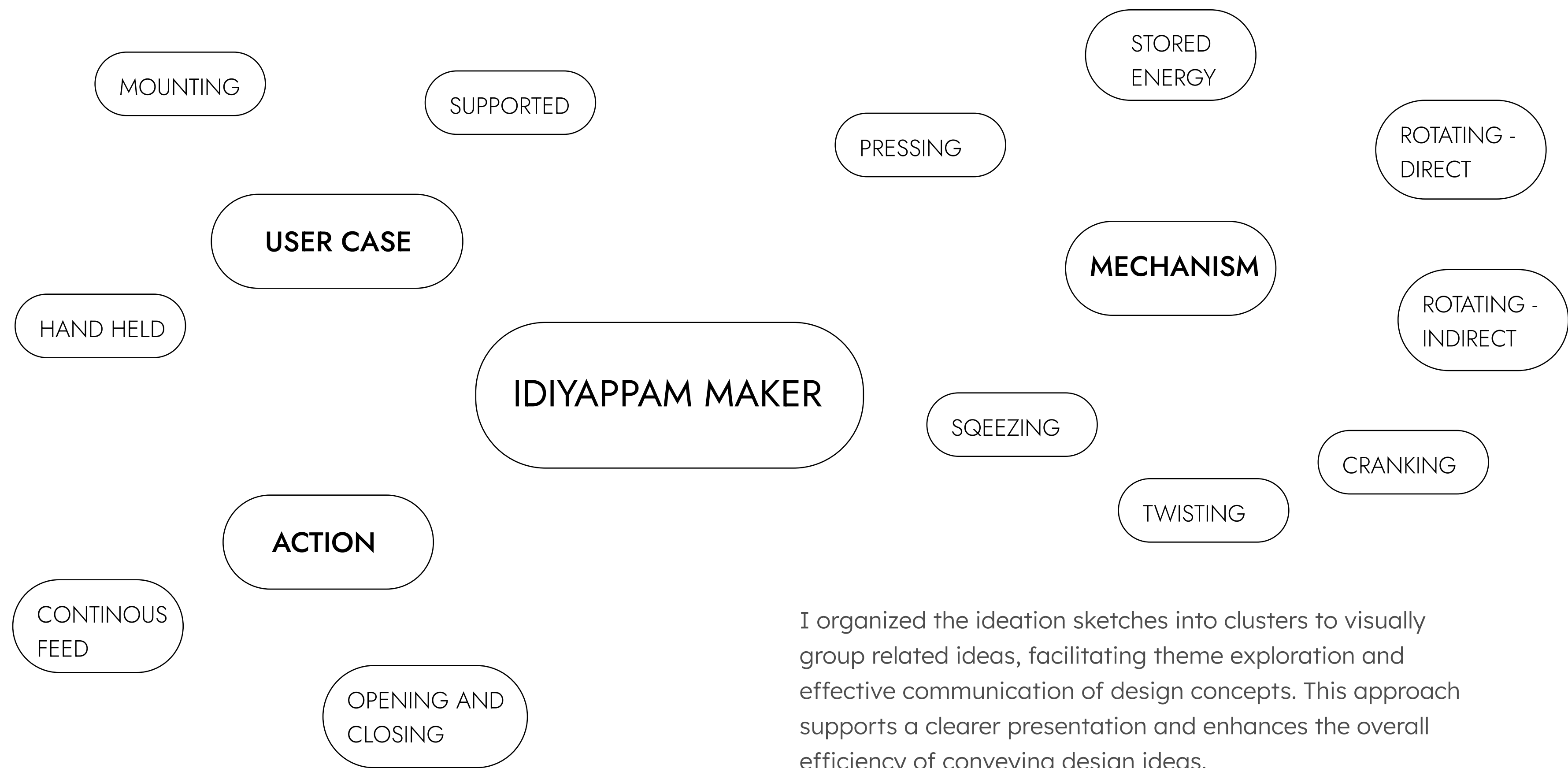
Ideation



Ideation

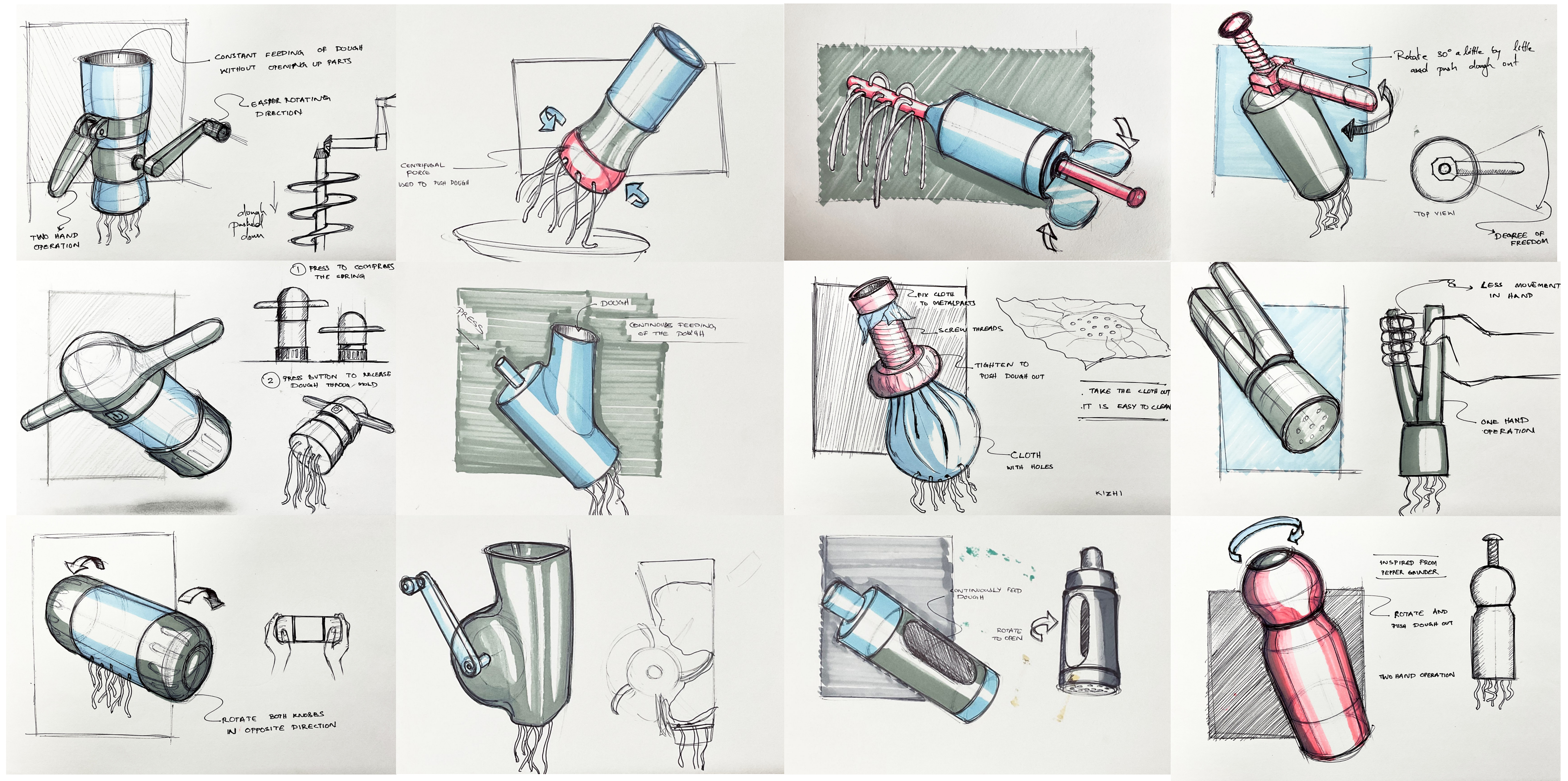


Clustering Ideation

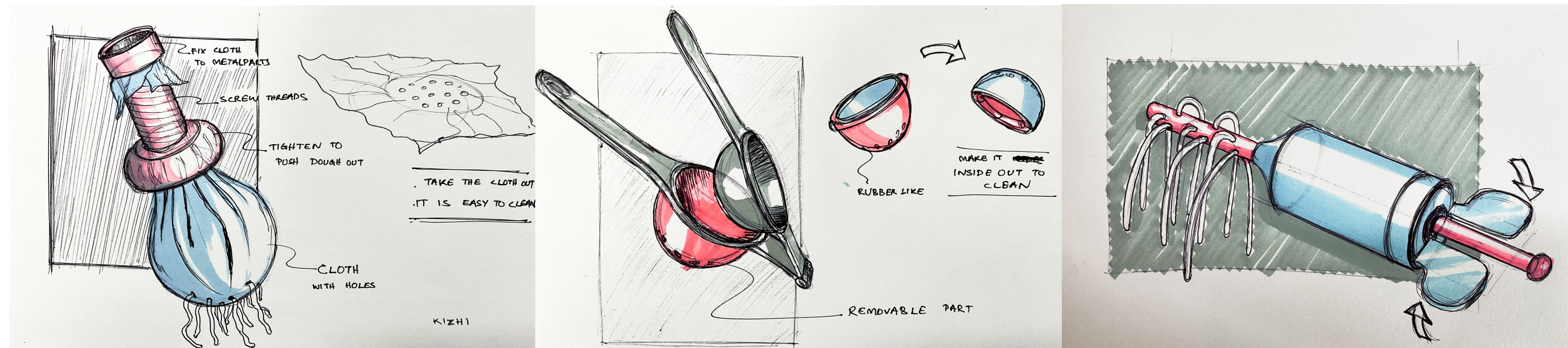


I organized the ideation sketches into clusters to visually group related ideas, facilitating theme exploration and effective communication of design concepts. This approach supports a clearer presentation and enhances the overall efficiency of conveying design ideas.

Use case- Hand held

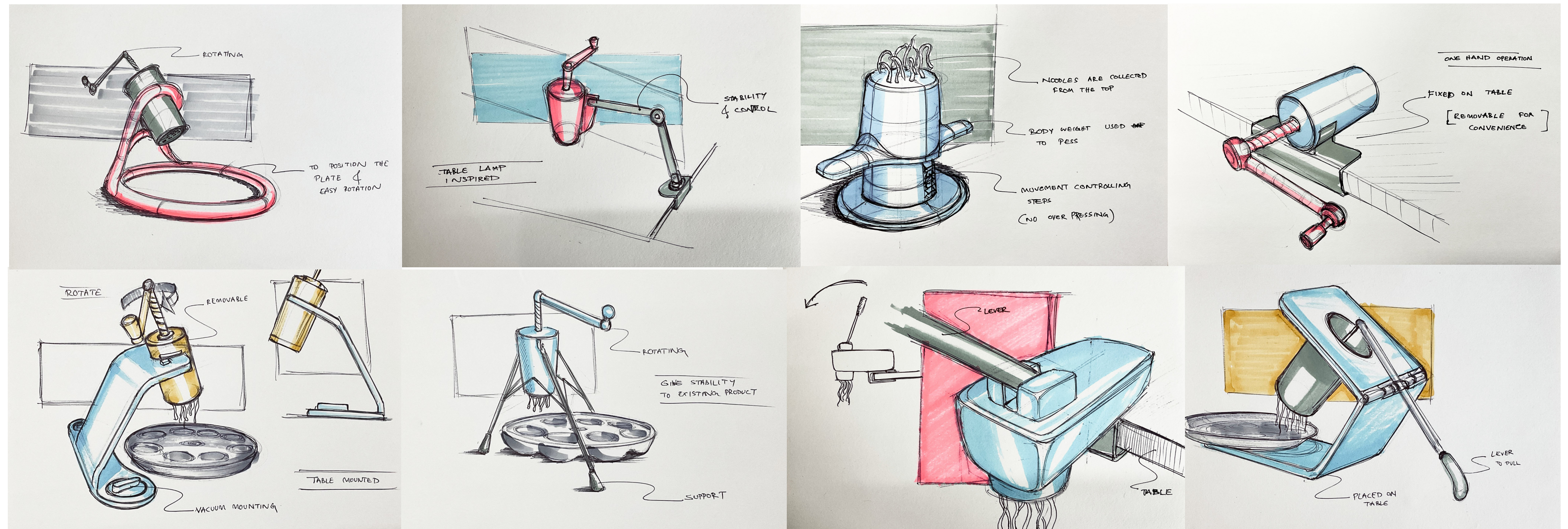


Mechanism- Squeezing

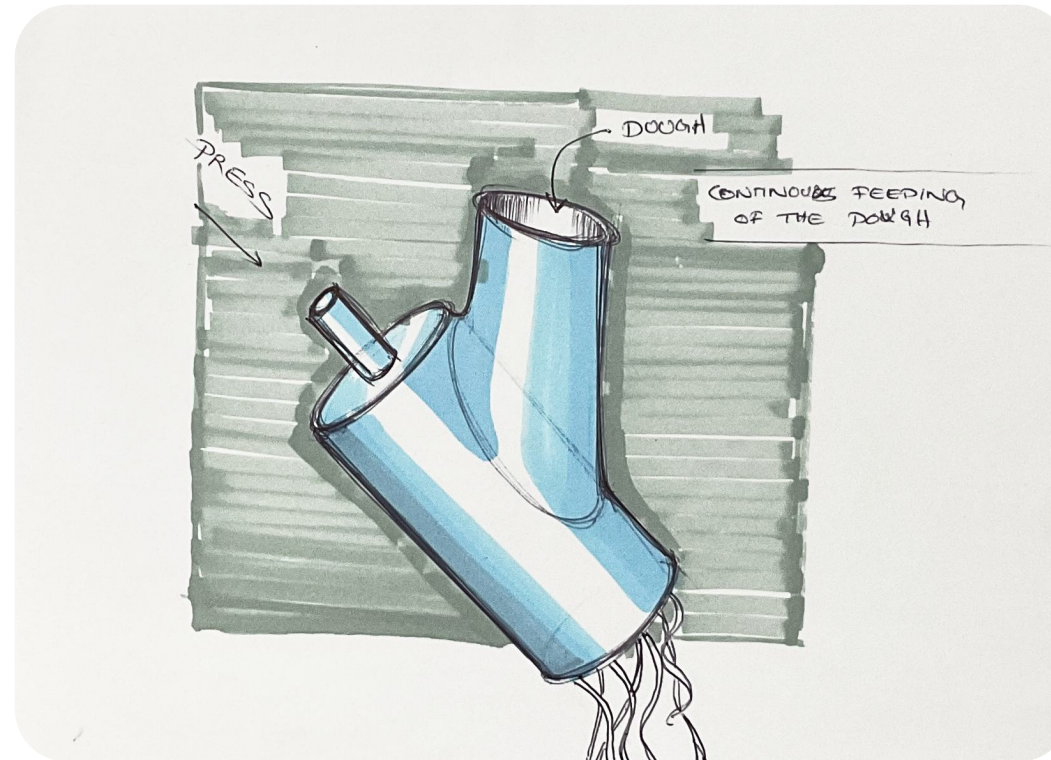


In the context of idiyappam maker mechanisms, each approach presents a unique set of advantages and disadvantages. Mechanisms like squeezing and twisting demand considerable effort, potentially resulting in increased fatigue during operation. Conversely, rotation and cranking mechanisms are designed to minimize the strain on hands, making them more user-friendly and efficient. While direct pressing can be inherently tiring, the innovative use of body weight as an assistant introduces an effective strategy to mitigate this challenge. By incorporating body weight into the pressing action, the overall effort required is significantly reduced, providing a practical solution to enhance user comfort and ease of use in the idiyappam-making process.

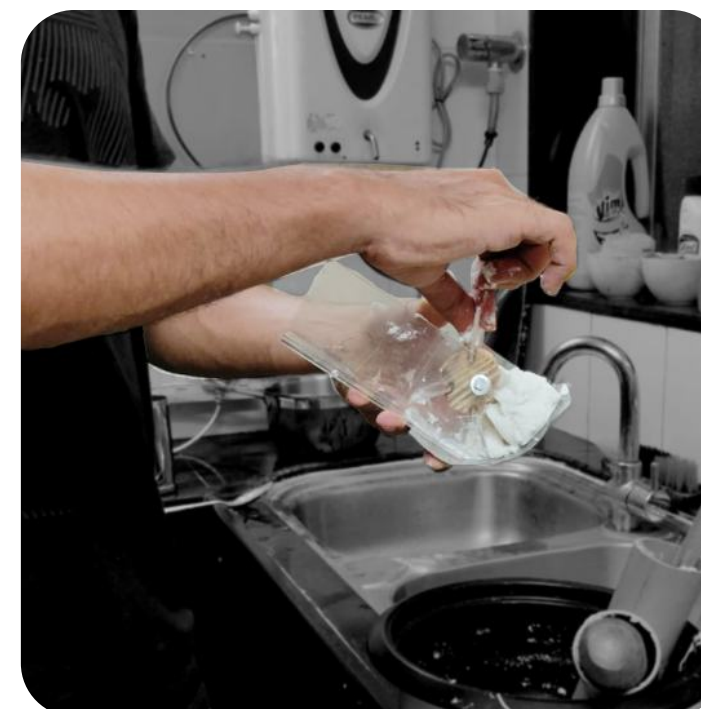
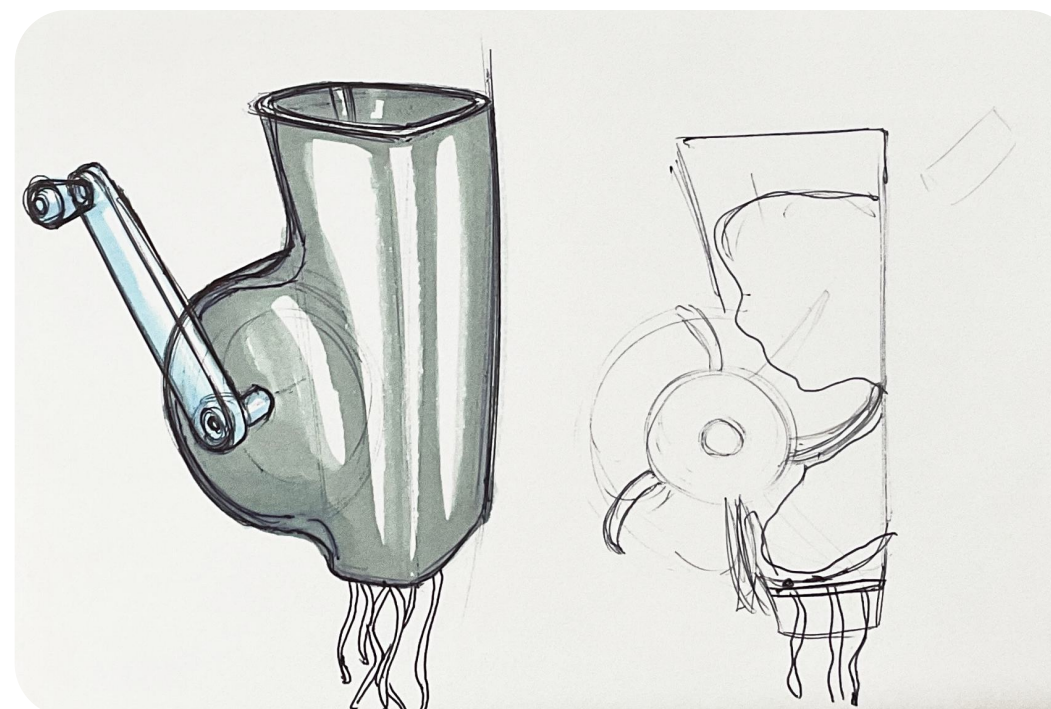
Use case- Mounting



Quick and Dirty Mock-ups



- The dough feeding speed has significantly decreased.
- Pushing the dough directly is a challenging task.
- Stabilizing the entire device proves to be difficult.



- The mockup failed to operate as intended.
- The rotating component was incapable of pushing the dough through the channel.
- Numerous intricate areas pose challenges for effective cleaning.

Use case- Supported

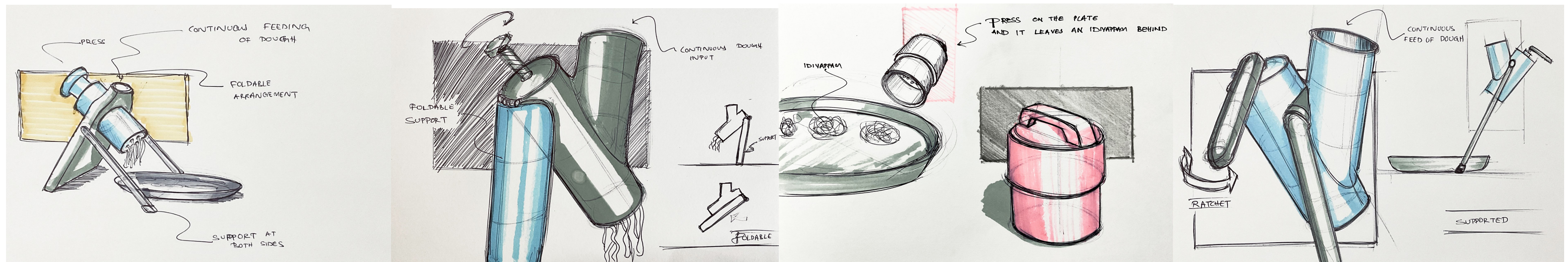
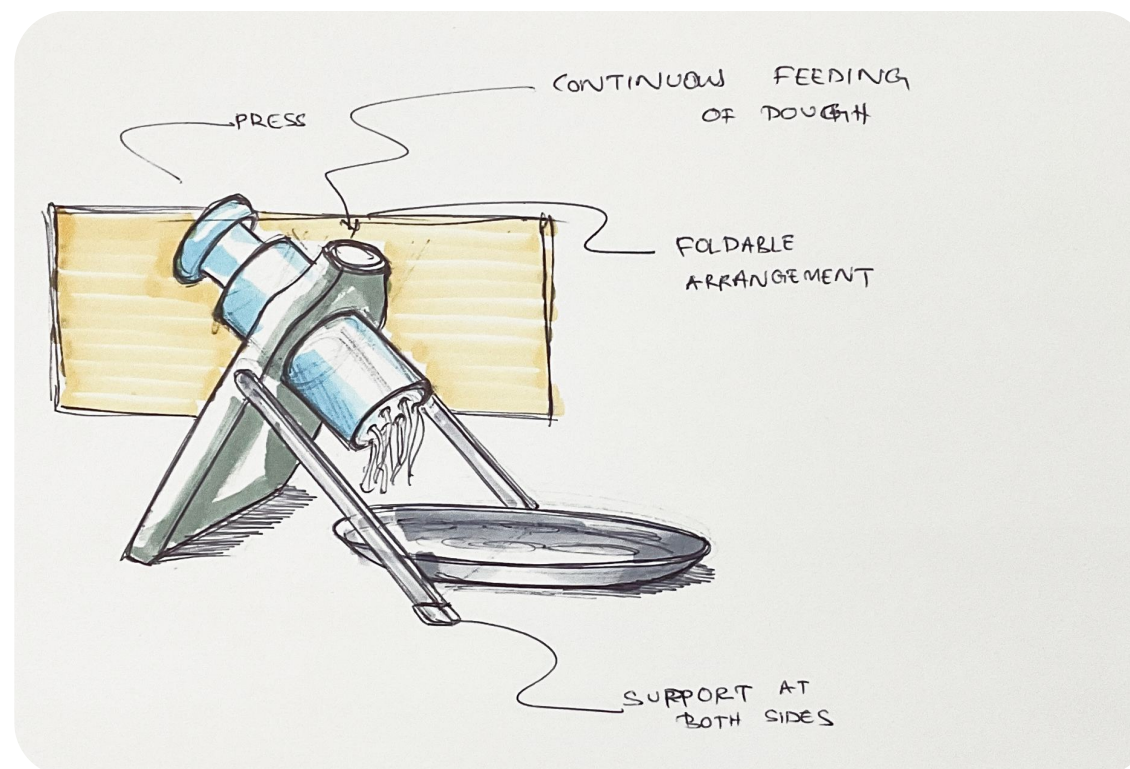


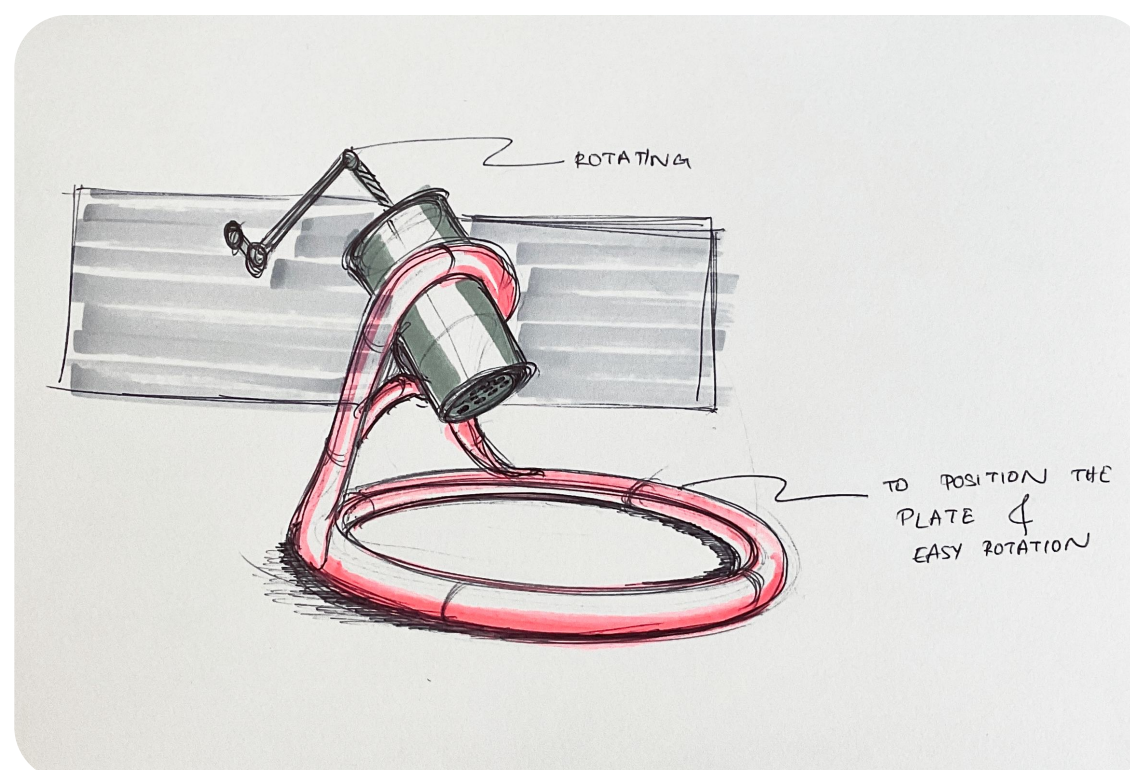
Table-mounted and supported user cases offer distinct advantages over handheld products. These instances benefit from increased stability as they receive partial or full support from the table. This stability is particularly advantageous during the pressing action, as it significantly reduces the effort required from the hand. Moreover, for mechanisms involving rotation and other actions that may destabilize the product, the use of a table mount or additional supports proves instrumental in maintaining stability.

However, it's worth noting that if the product is inherently stable during use, handheld options provide the freedom to move around with the device. In such cases, where stability is already assured, the handheld design offers greater flexibility and mobility for the user. The choice between table-mounted and handheld configurations depends on the specific requirements of the user and the stability considerations inherent in the design of the idiyappam maker.

Quick and Dirty Mock-ups



- A minor support significantly alleviated the hand's load.
- Stabilizing the device during rotation became easier than before.
- After each dough pressing, removing the cap is challenging.

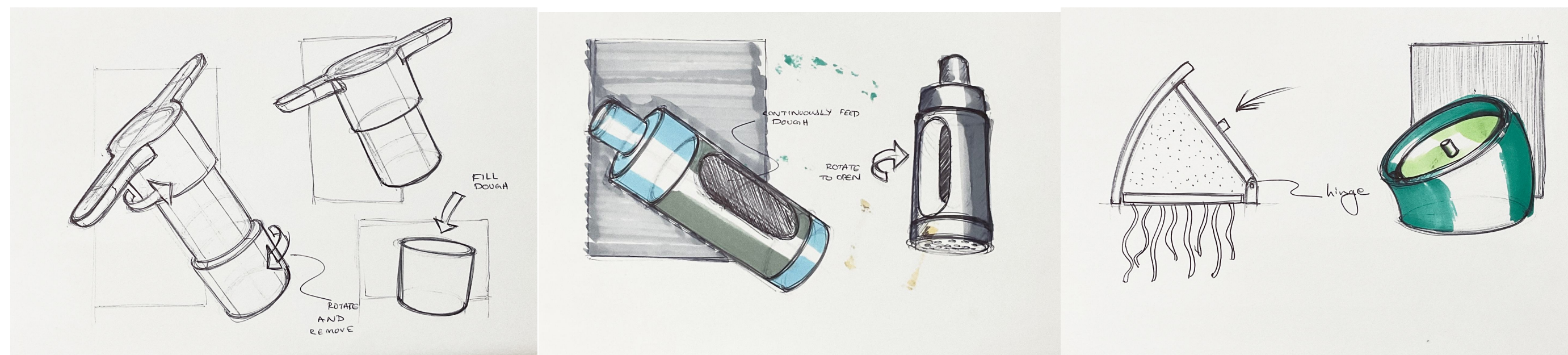


- Stability relieved the primary stress from the entire process.
- The product's weight no longer tires the hand.
- The rotary motion should not lift the product.

Action- Continuous feed



Action- Opening and closing



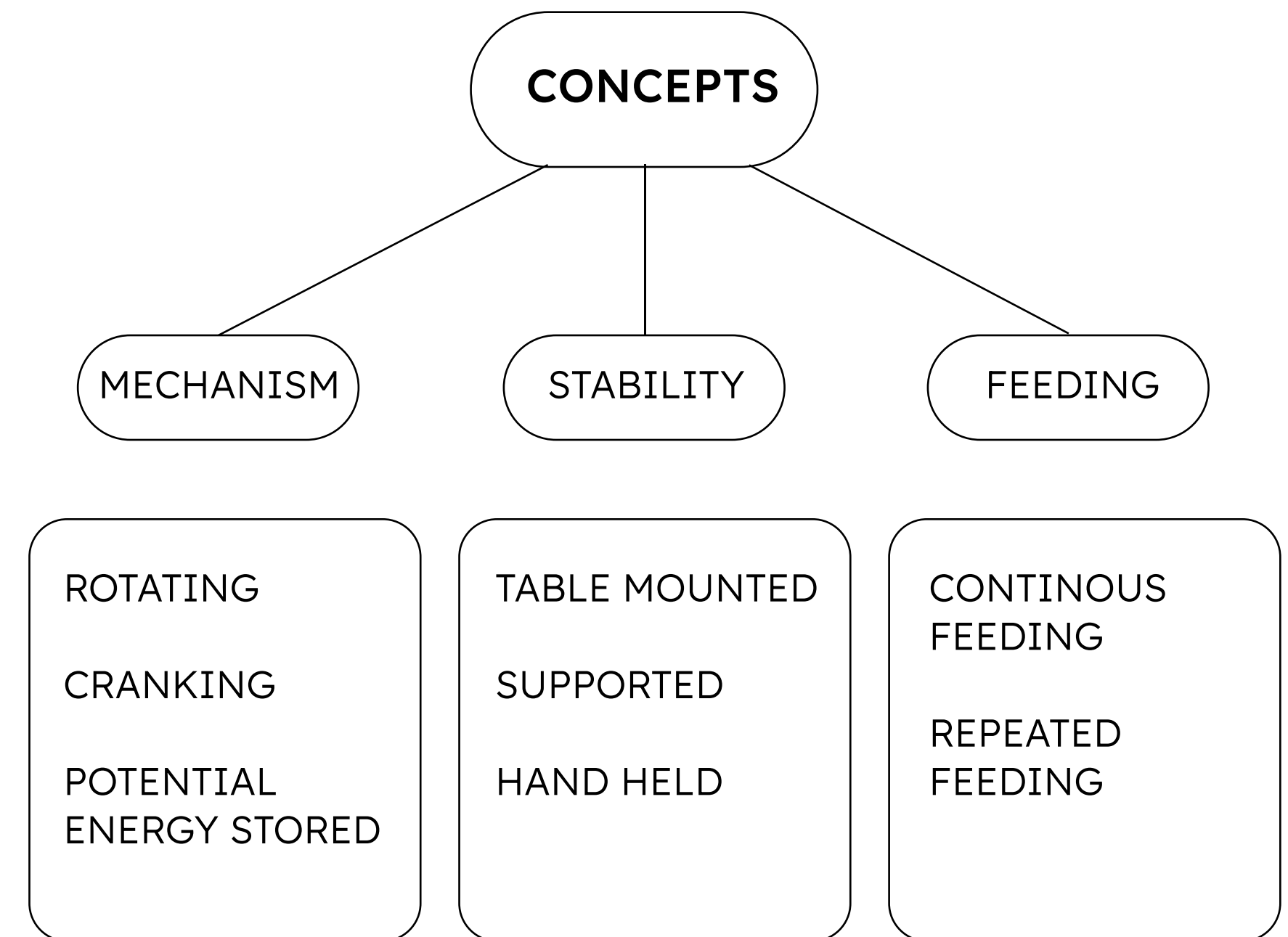
Continuous feeding and the ability to swiftly open and close for dough refilling can significantly decrease the time required to use the product, ultimately reducing the overall effort expended in making an entire batch of idiyappam.

Concepts

Exploration of the idiyappam maker design encompasses three crucial factors, each pivotal for improvement. The first area centers on devising a mechanism that efficiently reduces the user's effort. By optimizing this aspect, the overall usability and user experience can be significantly enhanced, promising a more seamless idiyappam-making process.

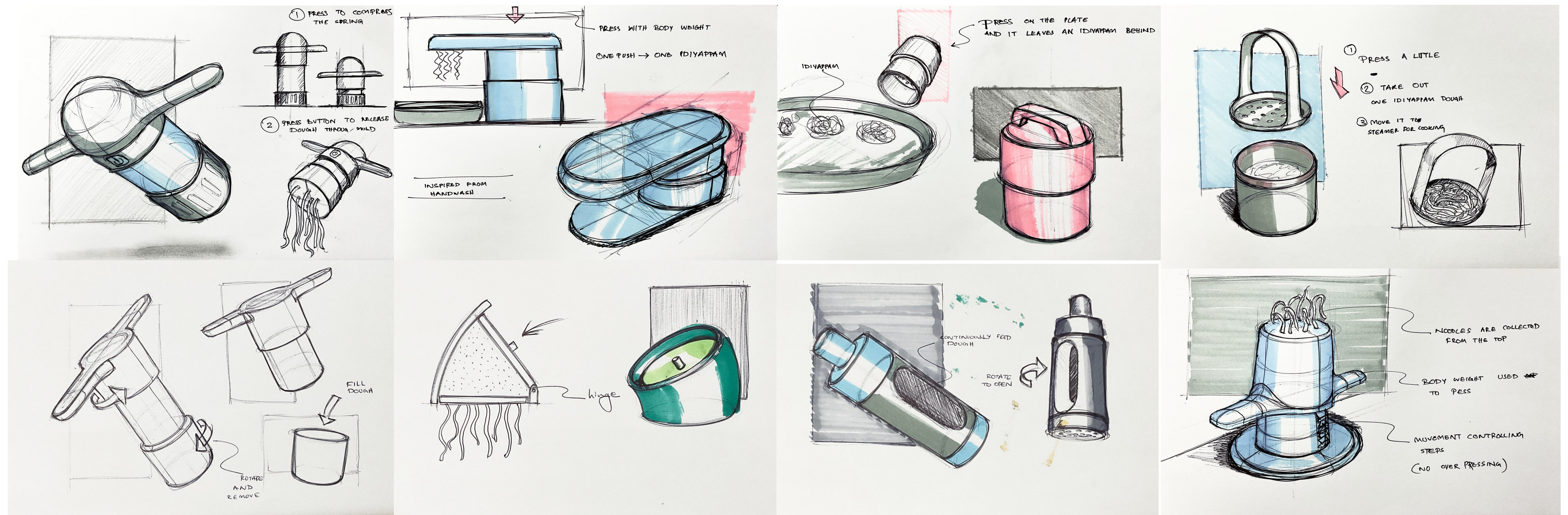
The second focal point revolves around ensuring the stability of the product during operation. This consideration aims to alleviate strain on the hands, potentially transforming the operation from a two-handed to a more user-friendly one-handed process. A stable device not only enhances usability but also contributes to the ergonomic design, making it more accessible to a wider range of users.

The third critical factor involves reevaluating the dough feeding method into the device. The current process is time-consuming, and by addressing this aspect, the entire idiyappam-making procedure can be expedited. Streamlining the feeding method not only reduces the time investment but also enhances the overall efficiency of the breakfast preparation, aligning with the goal of minimizing effort for the user.

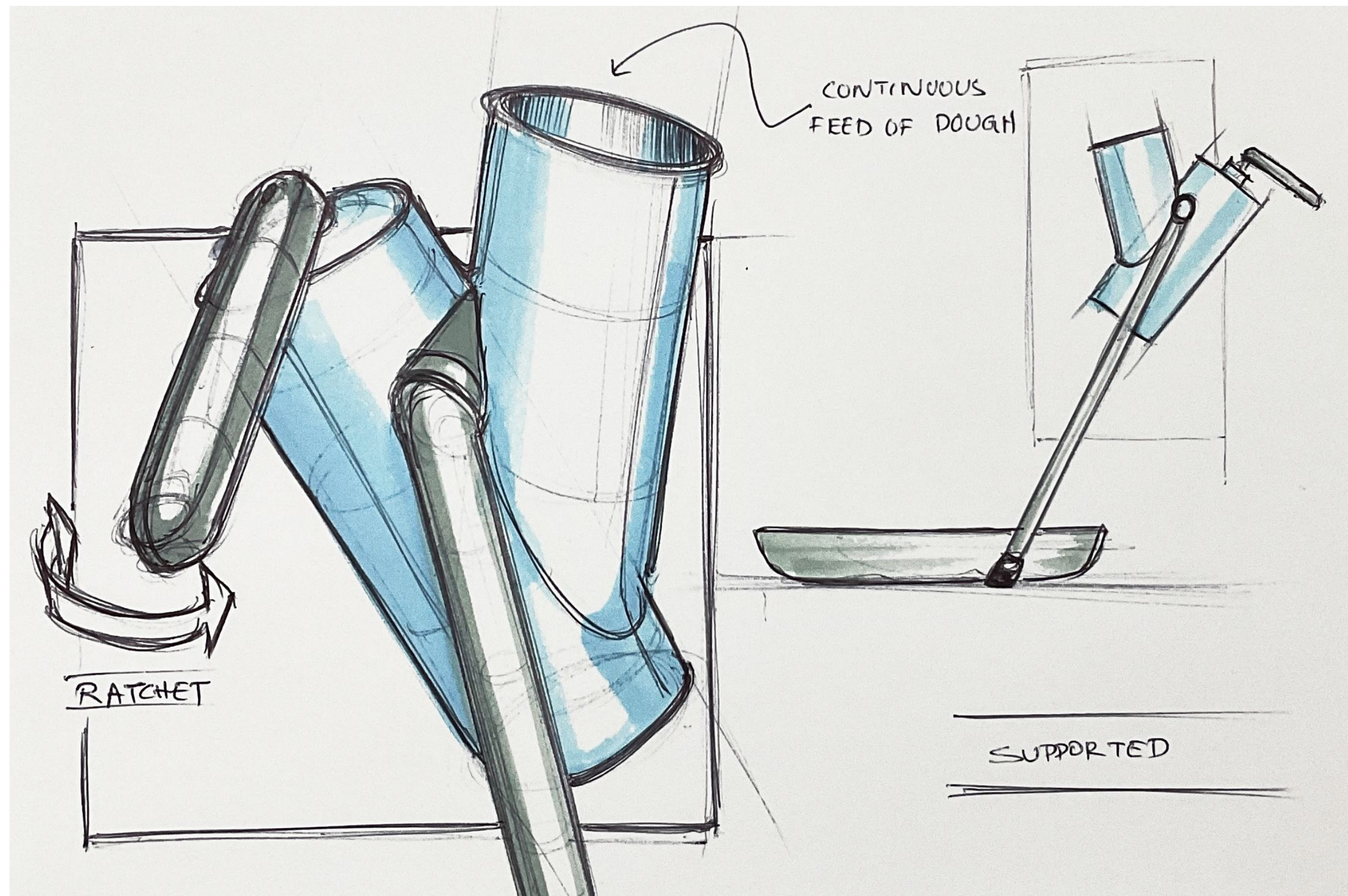


A combination and experimentation with these factors were undertaken to formulate the ultimate three concepts for redesigning the idiyappam maker. This process involved blending and matching various elements to arrive at innovative solutions aimed at enhancing the overall functionality and user experience of the device.

Mechanism- Pressing



Concept 1

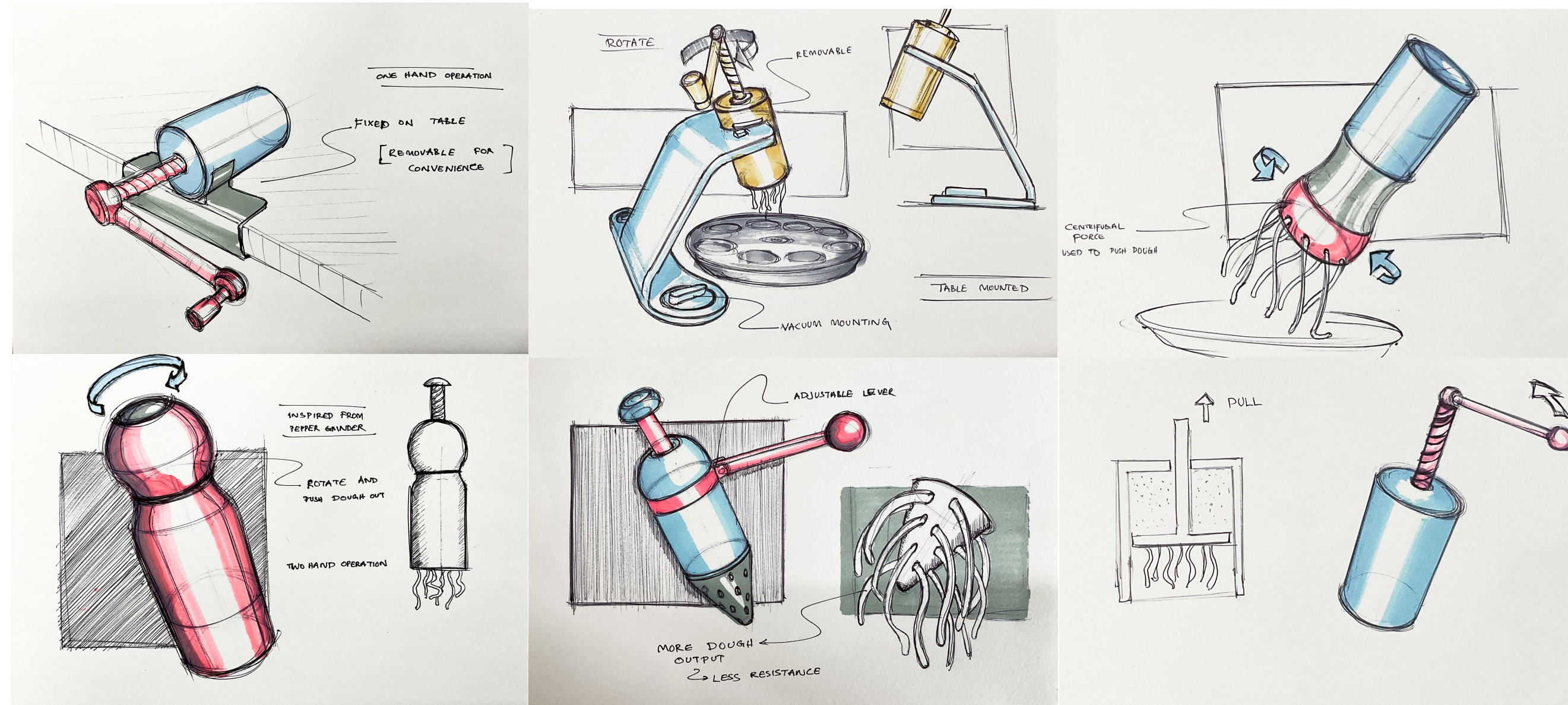


MECHANISM — CRANKING

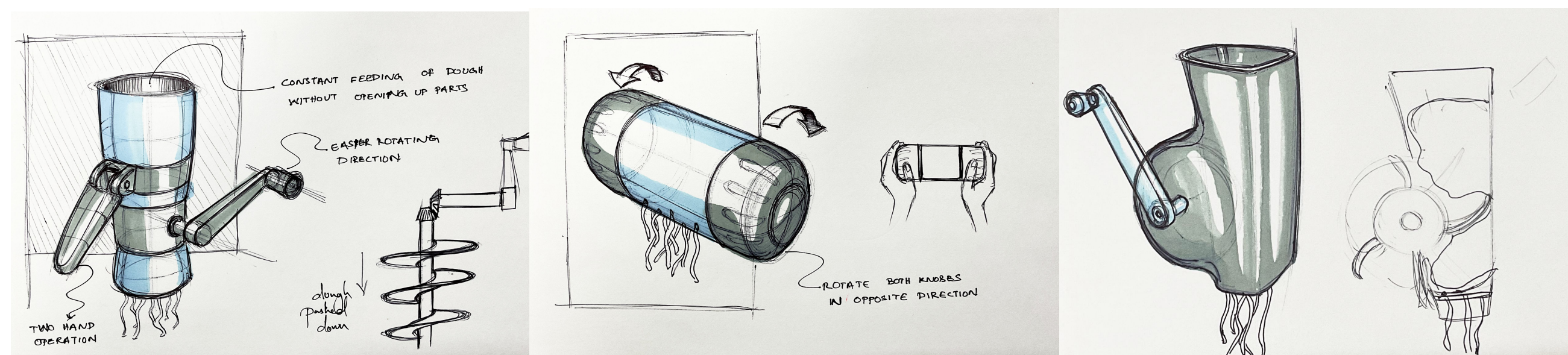
STABILITY — SUPPORT

FEEDING — CONTINUOUS

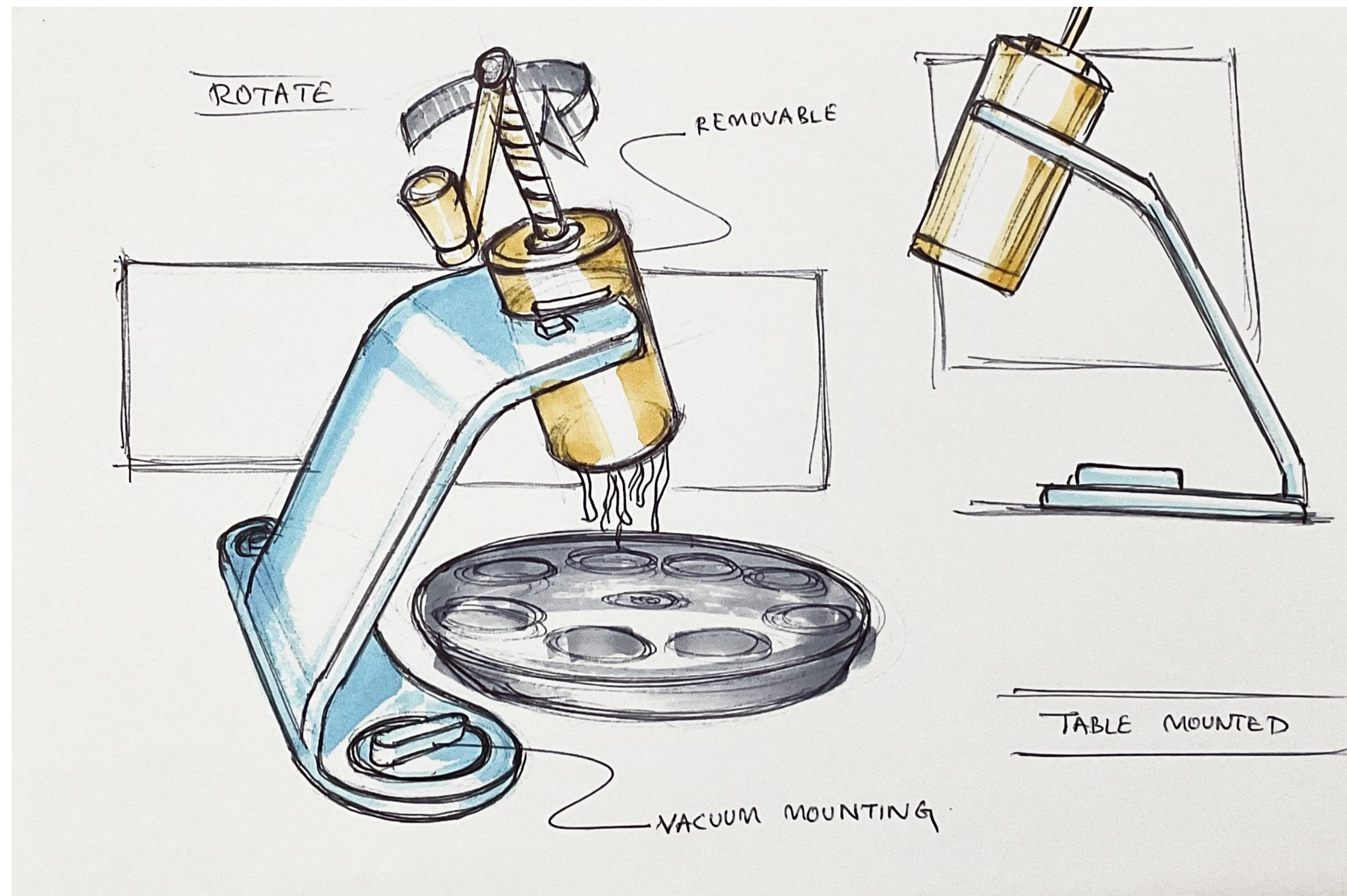
Mechanism- Rotating (Direct)



MECHANISM - ROTATING (INDIRECT)



Concept 2

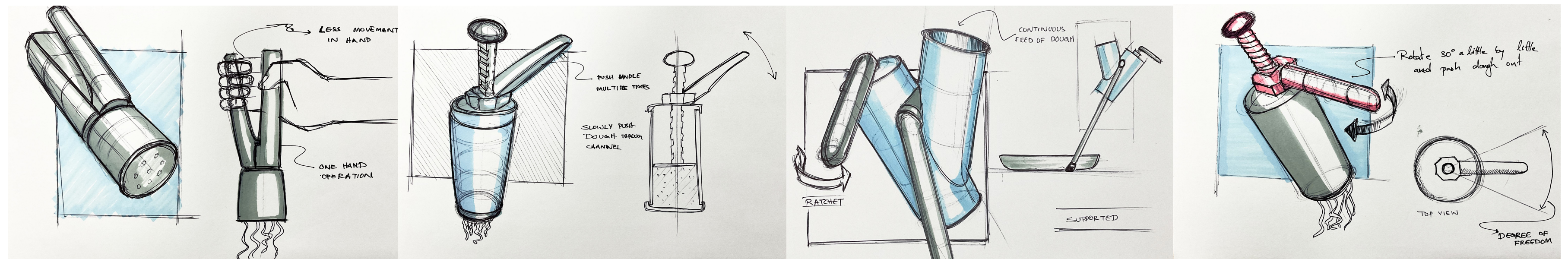


MECHANISM — ROTATORY

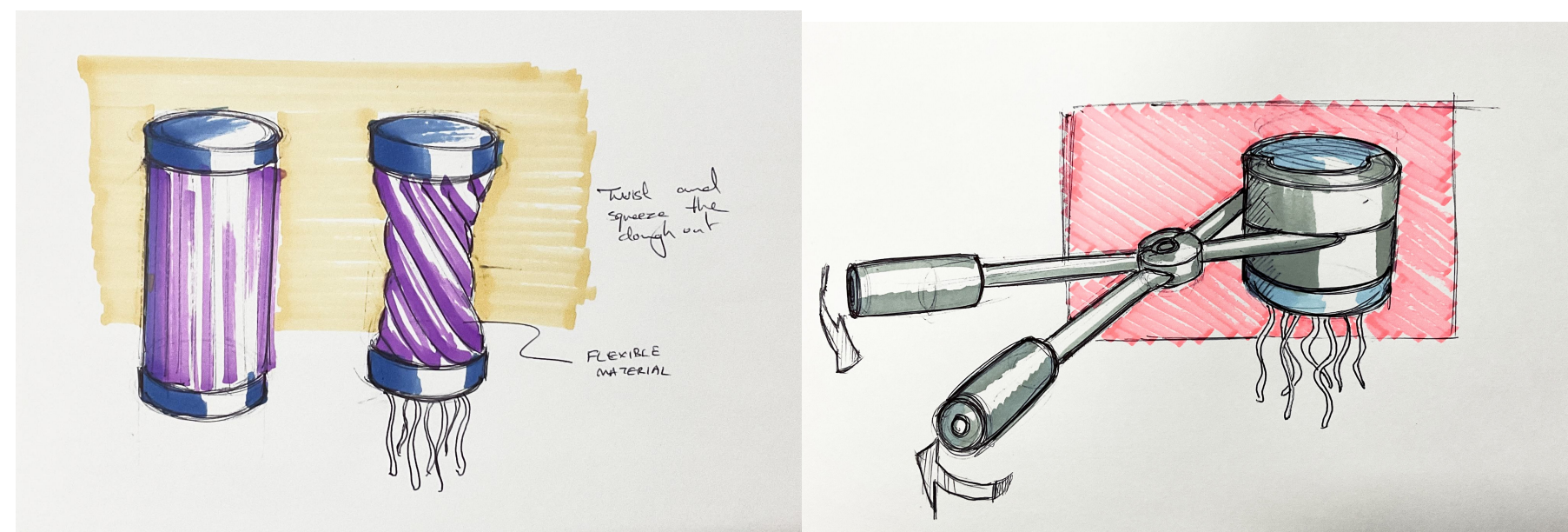
STABILITY — TABLE MOUNTED

FEEDING — REPEATED

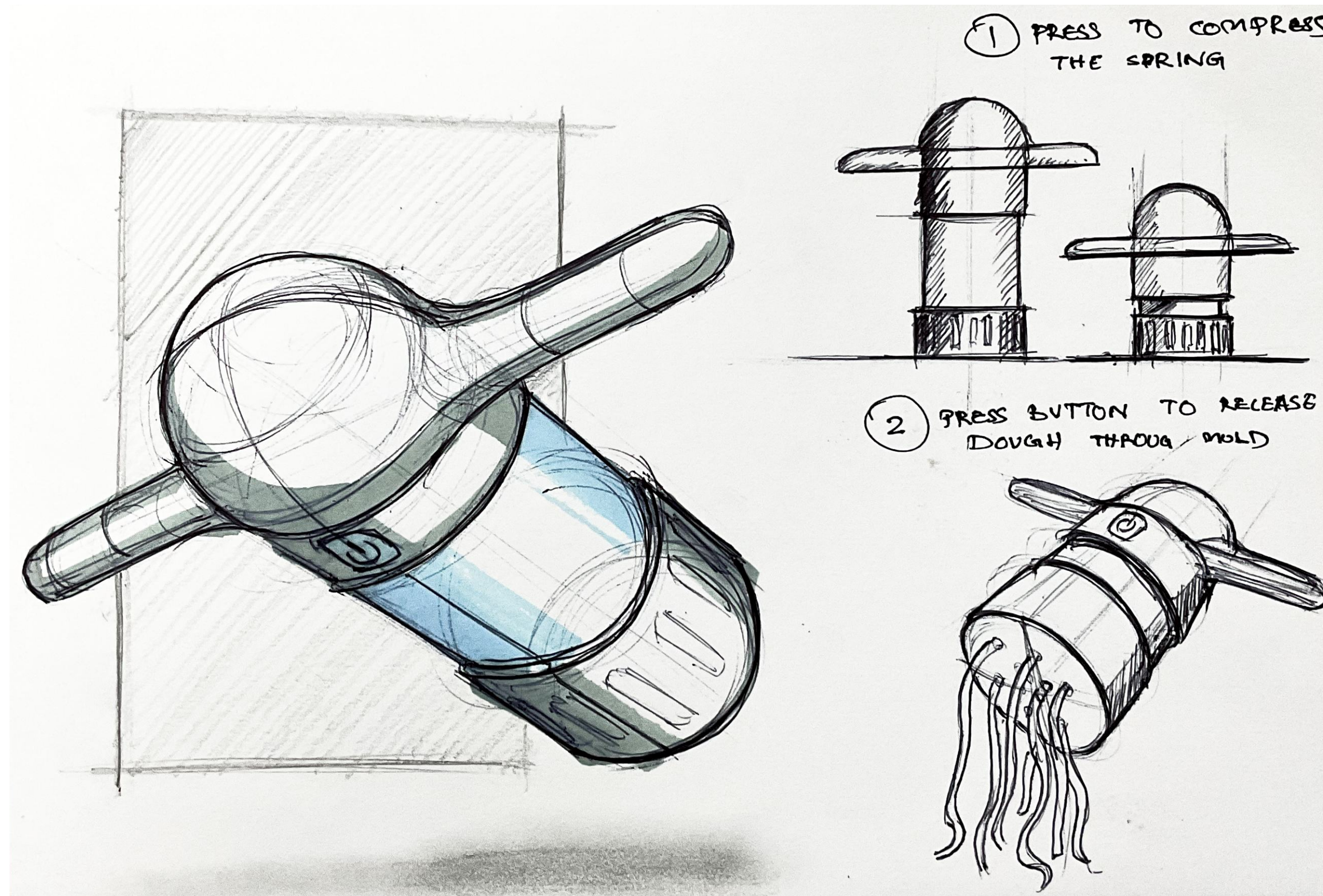
Mechanism- Cranking



Mechanism- Twisting



Concept 3



MECHANISM

POTENTIAL
ENERGY
STORED

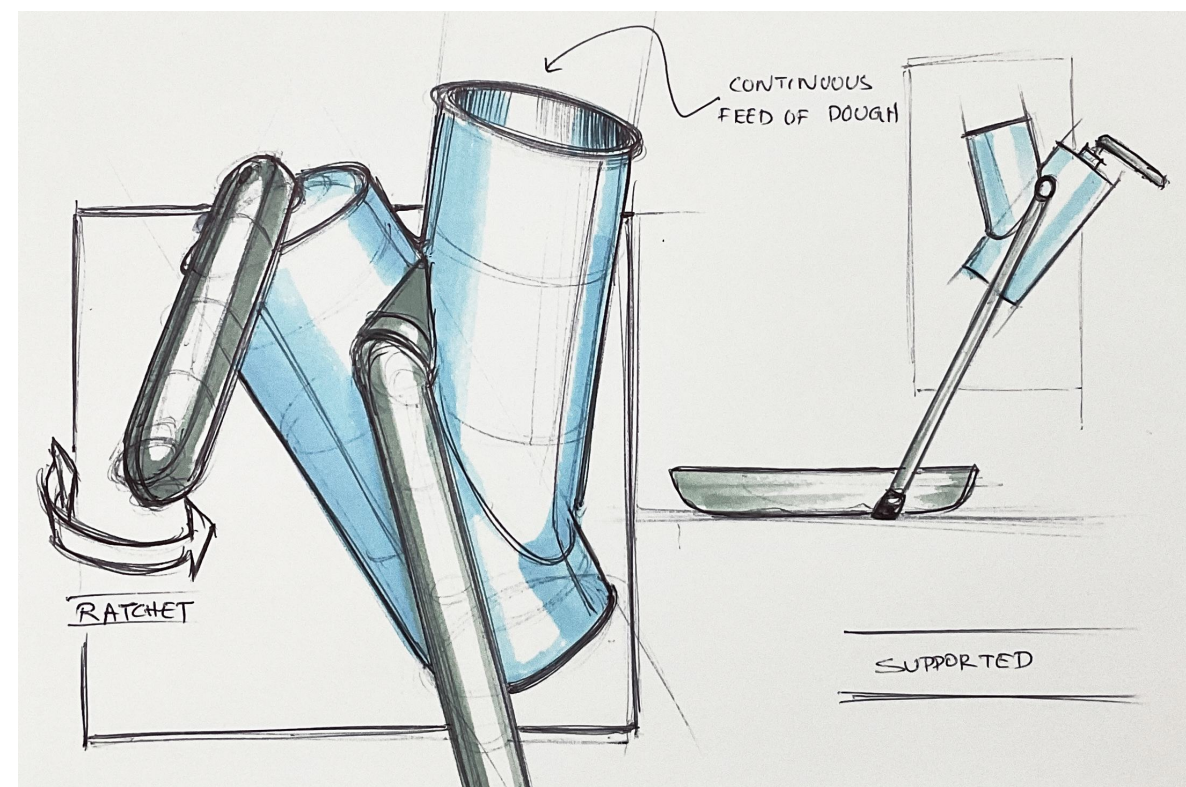
STABILITY

HAND HELD

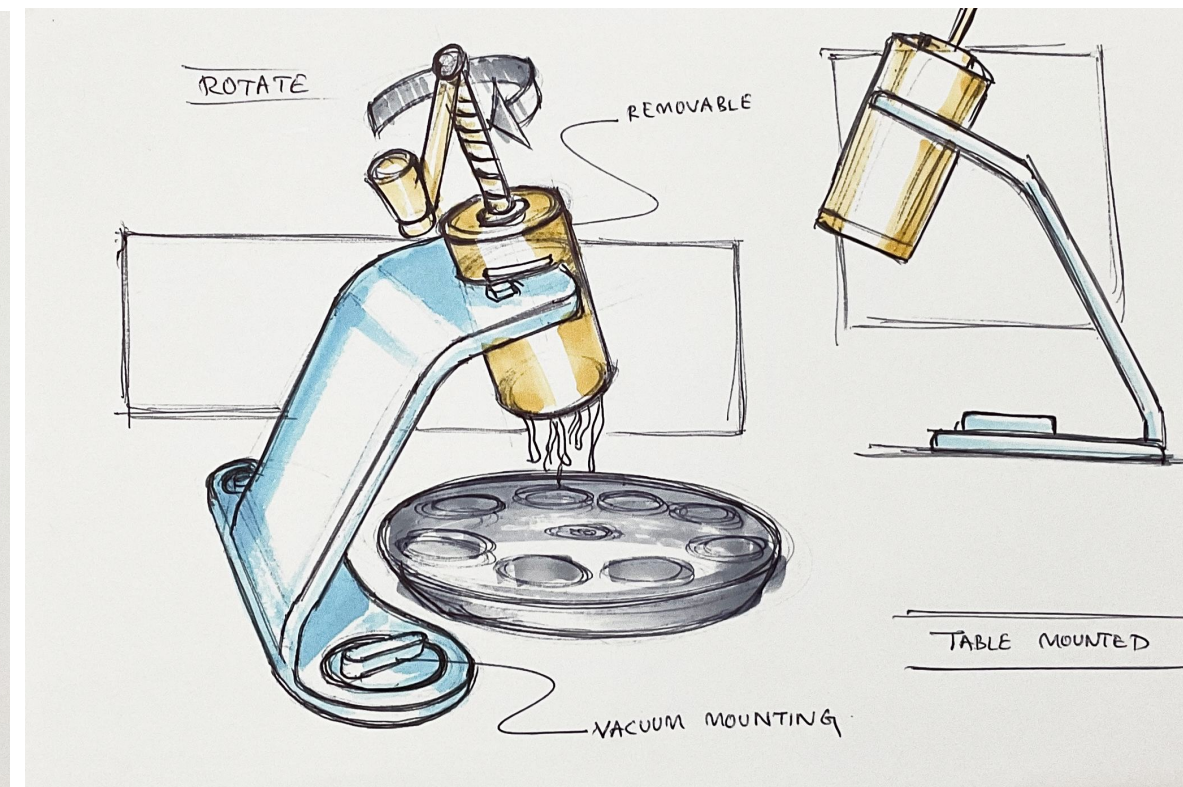
FEEDING

REPEATED

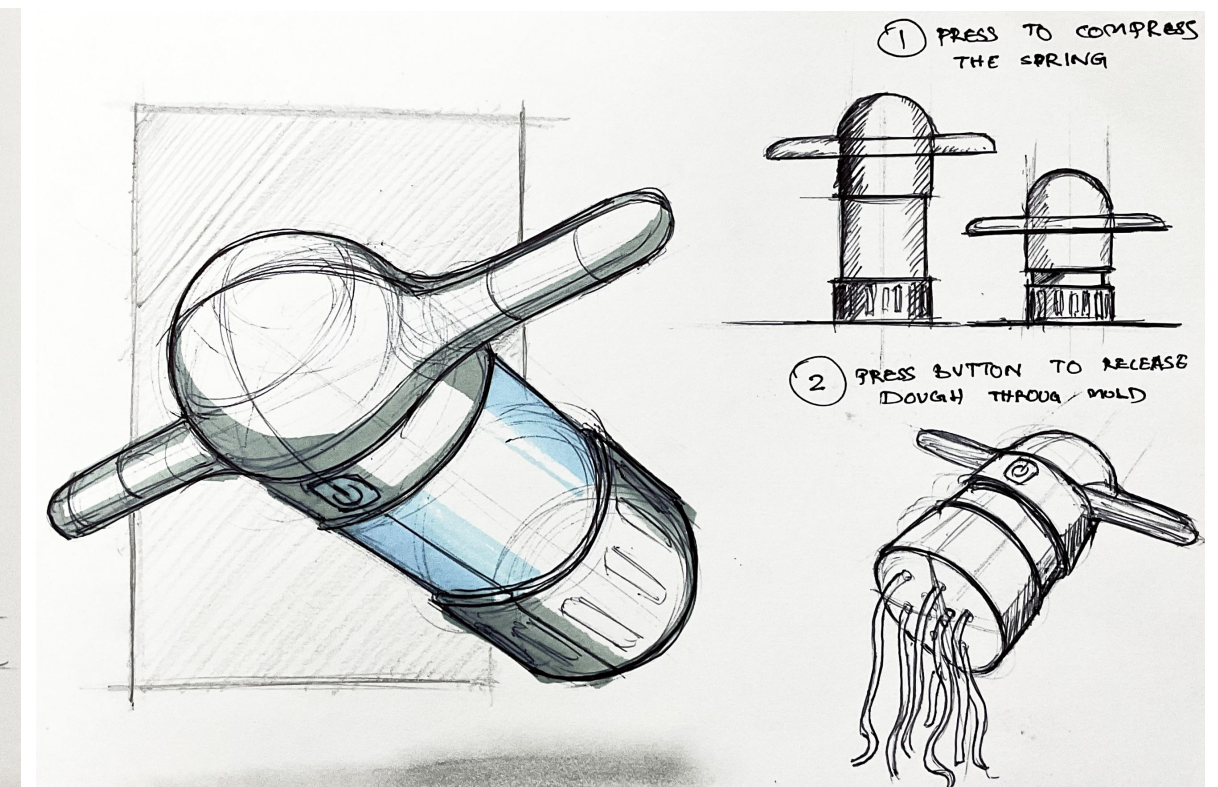
Comparison



- 1. The cranking mechanism minimizes hand movements, reducing fatigue during operation.
- 2. The support system enhances the overall stability of the device, ensuring that the product remains stable despite the reduced movement in the mechanism.
- 3. Consistent dough feeding decreases the overall usage time.
- 4. Cleaning proves challenging in the current design.
- 5. While the device freely moves around the plate, users need to exercise caution.

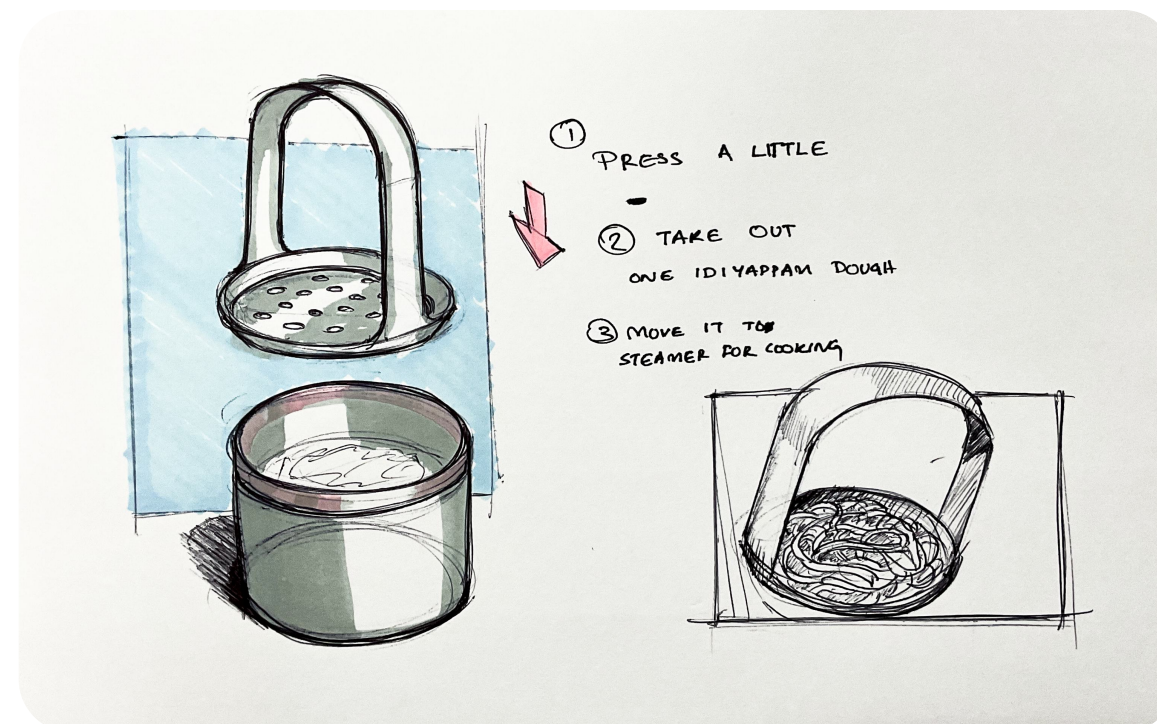


- 1. A familiar and continuous rotational movement, coupled with robust support, significantly reduces hand strain.
- 2. The vacuum support ensures product stability on any surface effortlessly.
- 3. Effortless removal from the fixture adds flexibility in usage, allowing for convenient refilling outside of the device.
- 4. Cleaning remains as straightforward as with the existing product.
- 5. However, the flow of idiyappam making is interrupted as the plate needs to be rotated after each idiyappam is produced.

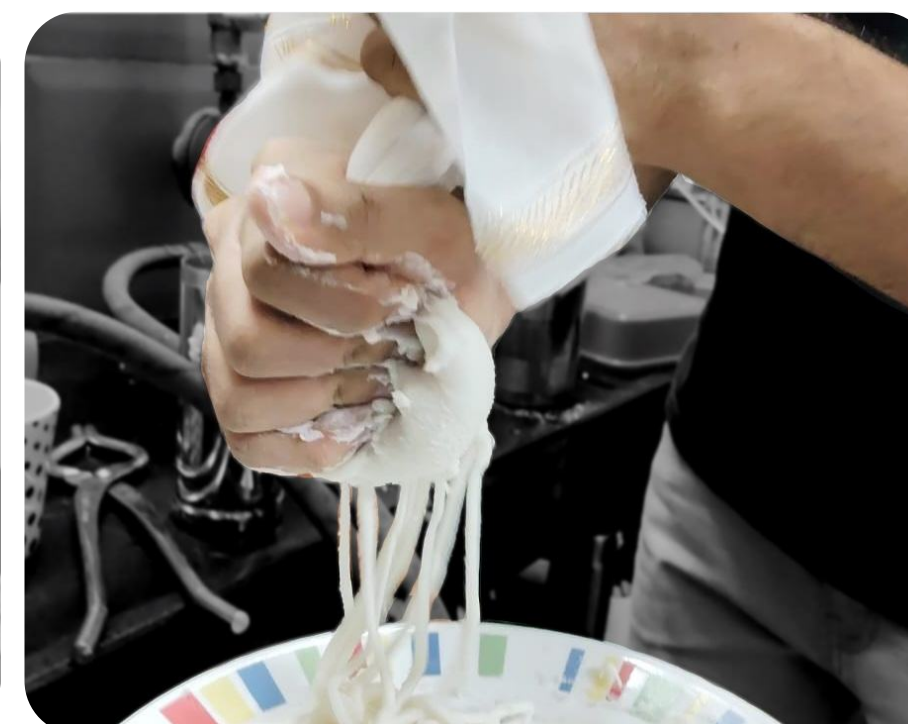
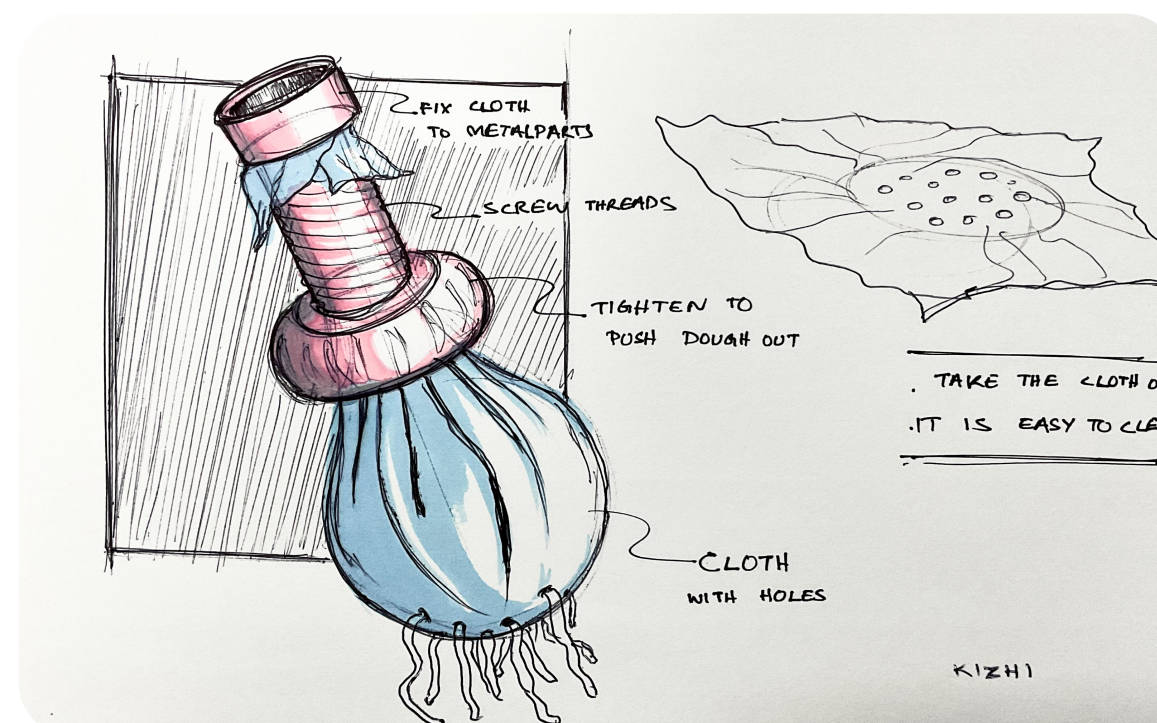


- 1. Utilizing body weight as assistance makes pressing the spring inside relatively easy when the device is placed on a table.
- 2. The use of a simple button mechanism for releasing eliminates stability concerns in this product.
- 3. To facilitate easy and repeated feeding, a simpler quarter lock is proposed instead of threaded mechanisms.
- 4. Cleaning becomes challenging in intricate areas if there is a leakage into the spring.
- 5. The device allows for free movement.

Quick and Dirty Mock-ups

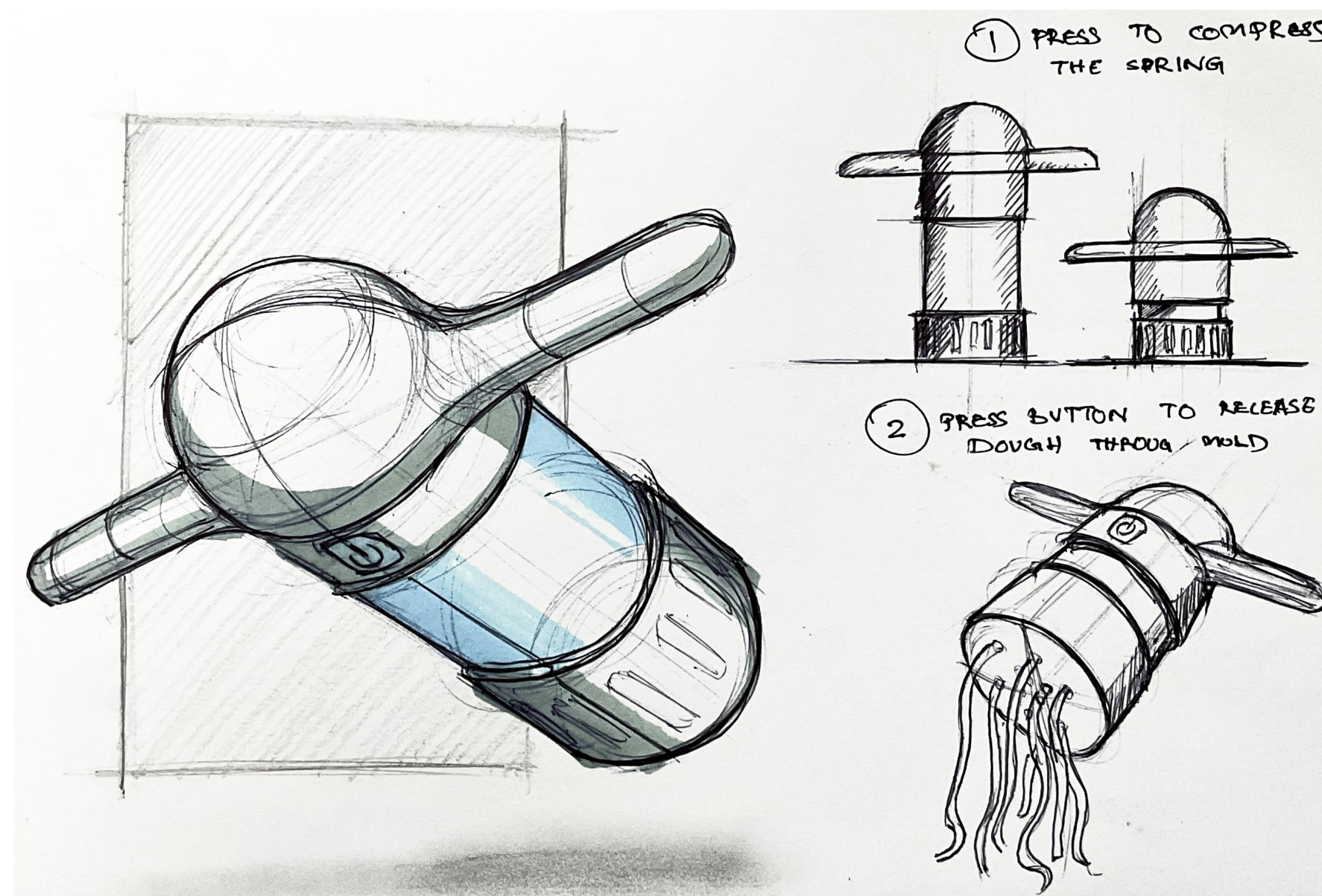


- Separating idiyappam individually is hindered by side leakage.
- Executing the task requires a considerably higher amount of force.
- Cleaning the storage container presents challenges.



- Cleaning the cloth post-use is a simple process.
- Dough seepage occurs through small pores in the cloth.
- Directly applying force is highly fatiguing for the palm.
- Consider the potential for tears and explore replaceability options.

Final Concept

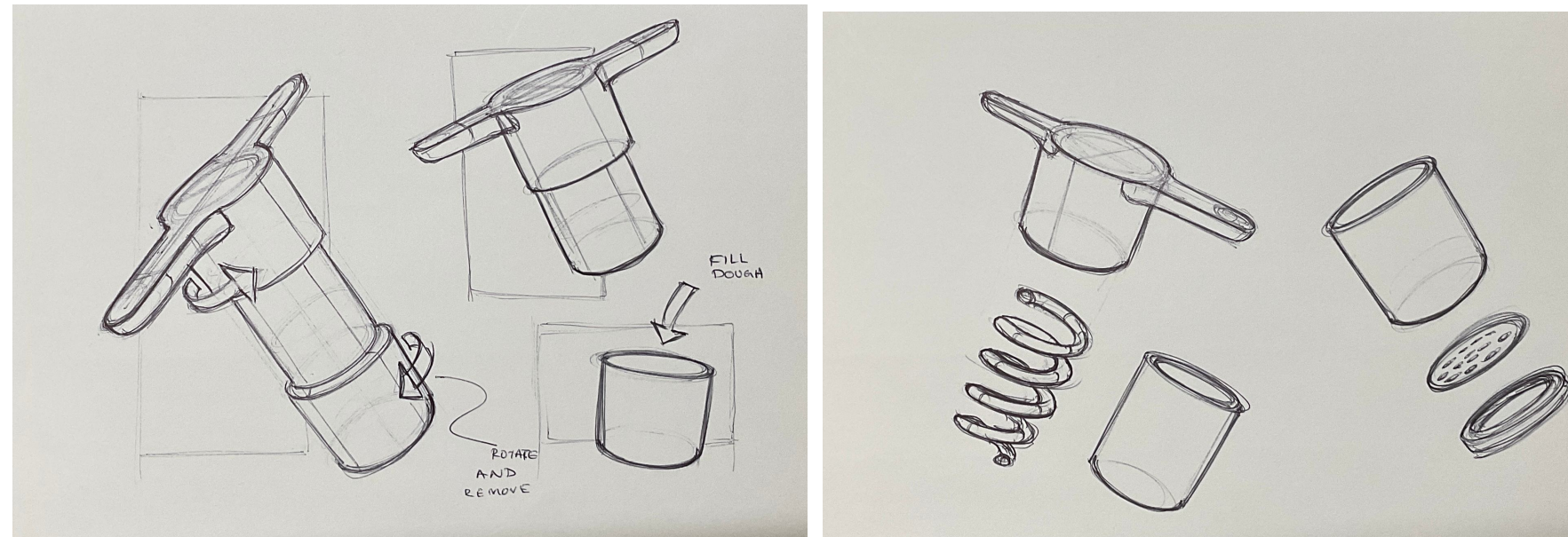


The primary goal of redesigning the idiyappam maker centers on minimizing the user's effort during operation. A particularly effective approach involves utilizing body weight as an assistant in the idiyappam-making process. In this innovative design, a spring mechanism is incorporated within the product. By pressing the device against a table with the user's body weight, the spring compresses and holds in position, storing potential energy. This approach significantly reduces the physical exertion required from the user.

The operation of this redesigned idiyappam maker involves a straightforward process. After compressing the spring, the user easily refills the dough into a removable compartment. Subsequently, releasing the potential energy stored in the spring is achieved with a single button. This controlled release then effectively presses the dough out through the channel, streamlining the idiyappam-making process. The simplicity of this design not only reduces the overall effort involved but also enhances the user experience.

Furthermore, beyond the efficiency gains, the redesigned idiyappam maker prioritizes user stability. The incorporation of a single button for spring release ensures ease of use, and the entire product remains stable in the user's hand during operation. This combination of reduced effort, streamlined functionality, and enhanced stability makes the redesigned idiyappam maker a user-friendly and efficient kitchen tool.

Detailing

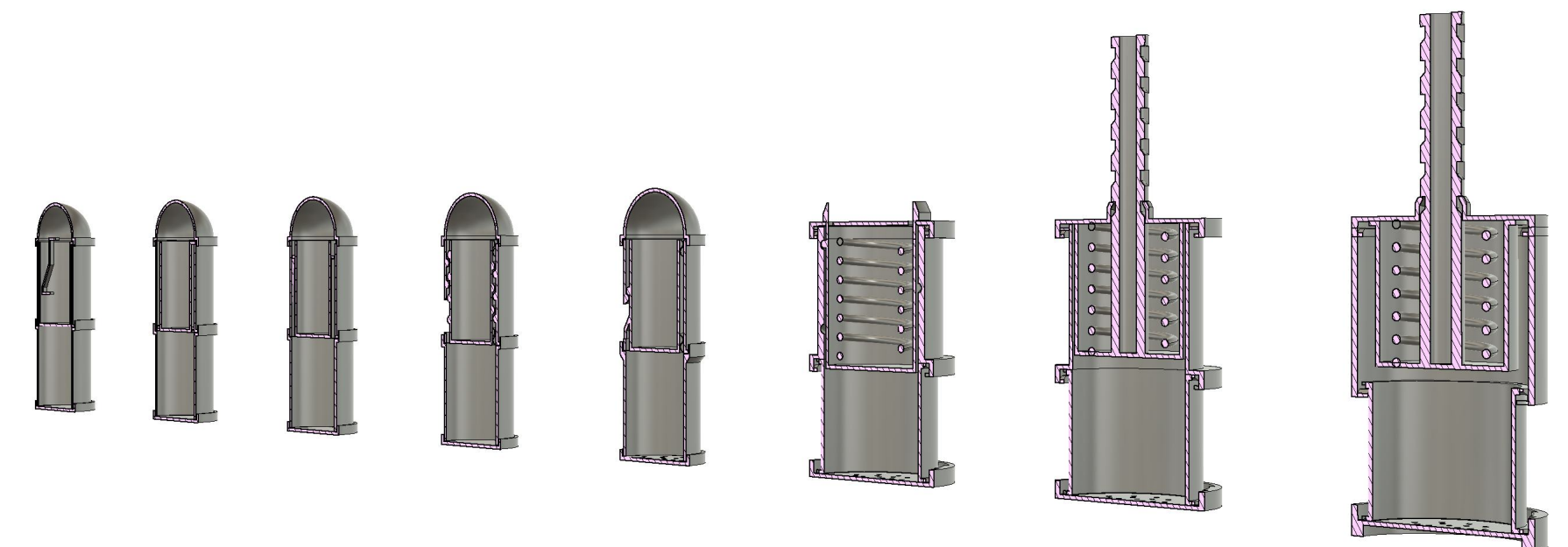


Transitioning from a conceptual idea to detailing the internal mechanism proved to be an extensive and intricate process. Initially, I anticipated drawing inspiration from various products, incorporating bits of mechanisms from different sources to develop this product. However, this approach proved less effective than expected. I looked to mechanisms in guns, locks, and products with springs to understand the working principles. Additionally, references were taken from cookers, mixer grinders, and other metal components for assembly details.



<https://kitchenmart.co.in/products/prestige-popular-aluminium-pressure-cooker-2-litres>
<https://www.flipkart.com/nsv-premium-quality-608-silver-heavy-metal-gun-shape-pistol-cast-iron-nickel-gas-lighter/p/itm216d4d7457caf>
<https://www.amazon.in/Air-Couch-Blaster-Suction-Multicolor/dp/B09RV45MCK>
<https://auxa.in/product/steel-pepper-crusher-grinder/>

Consultations with fellow students, PhD aspirants, and professors over weeks yielded no breakthrough in understanding the mechanism. Some suggested unique ideas, like inverting the device to press and rotating it back to the original position for dough release. However, translating these ideas into simple and practical details proved challenging. Discussions also highlighted the need to consider aspects such as the requirement for occasional oiling of the spring, emphasizing the importance of accessibility.



Efforts to visualize the pressing action through block models and sketches proved unproductive. Subsequently, I turned to creating CAD models, allowing a three-dimensional visualization of the mechanism.

Mock-up and testing

Iterating through various models, each presented its own set of challenges to be addressed. To overcome conceptual roadblocks, I began 3D printing scaled-down versions, allowing for hands-on problem-solving. After numerous iterations, a potential solution emerged, addressing multiple issues within the design.

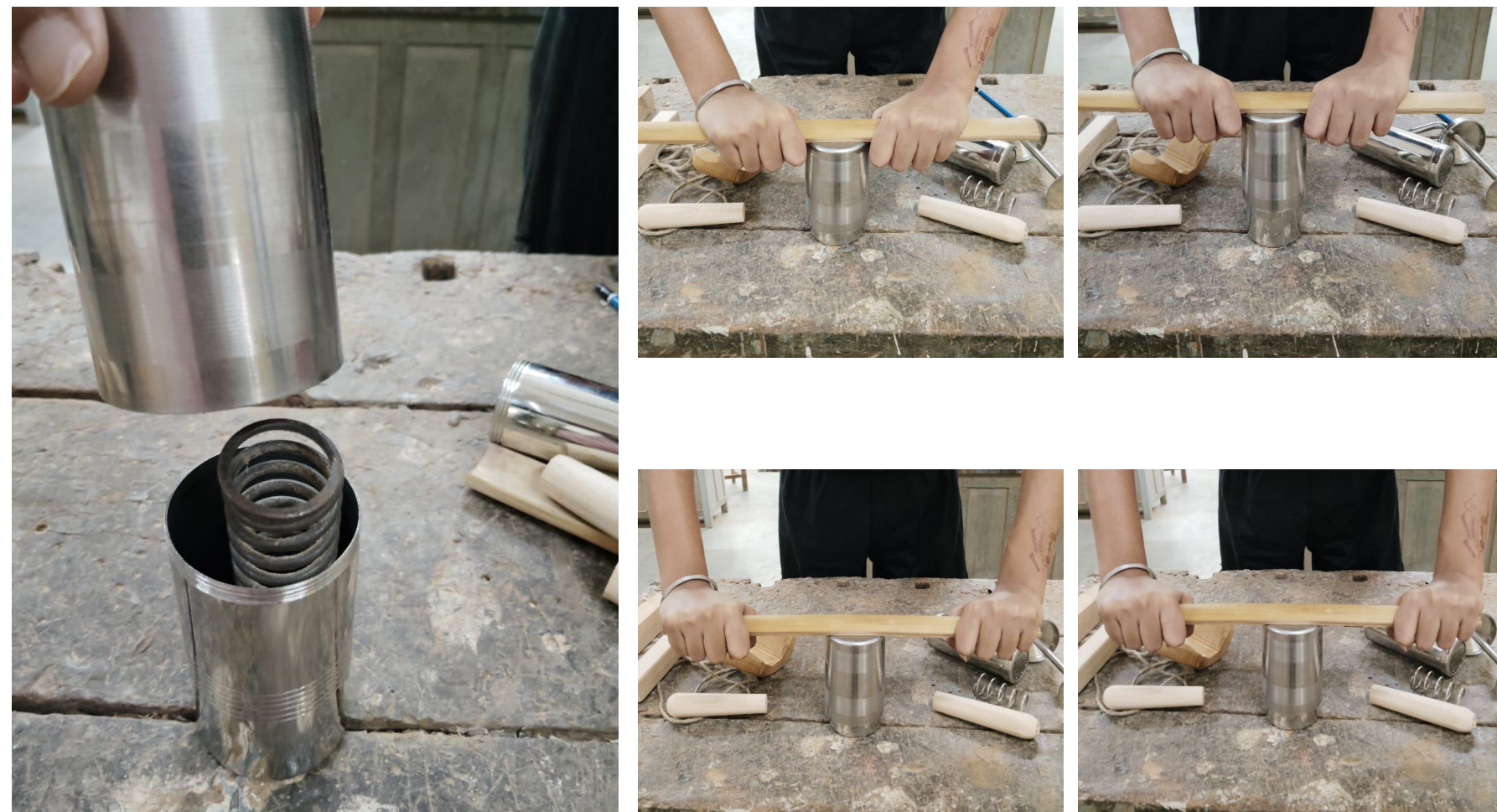


This 3D-printed mock-up, featuring a groove to guide and manipulate the pressing part, facilitated comprehension of alterations in the arrangement of components.



The mechanism for locking the moving piston part at specific positions was elucidated using an extended section with snap-lock details in this model. The visualization and experimentation with this model illustrated how the lock is released.

Handle and posture

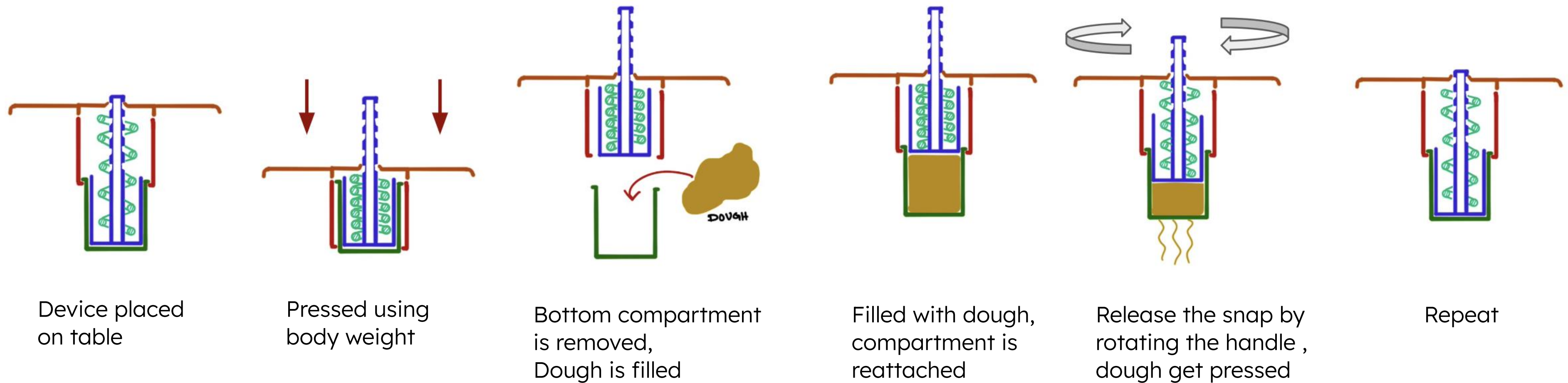


Pressing the spring with the assistance of body weight emerges as a notably easy and user-friendly aspect of the idiyappam maker operation. However, it's crucial to exercise caution when applying force away from the vertical, as this may increase the risk of toppling. Striking a balance in grip positioning is essential, with a longer distance providing greater stability and control compared to a closer grip.



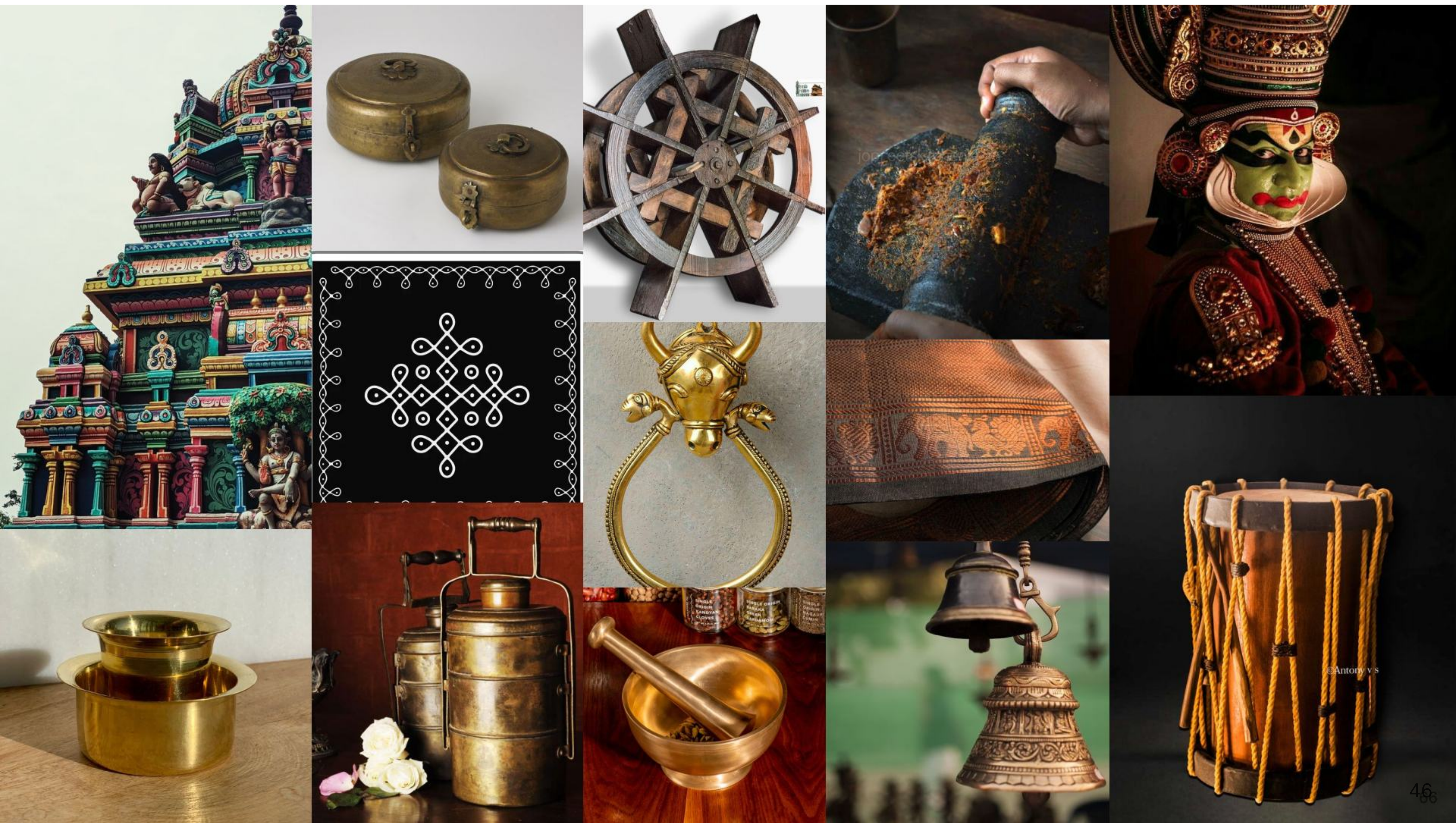
Directing force vertically with the idiyappam maker proves challenging, demanding precision and control. Simultaneously, there's a notable risk of hand slipping off the handle, underscoring the importance of a secure grip for user safety. Negotiating these challenges requires careful attention to force application and grip stability, emphasizing the significance of ergonomic considerations in optimizing the idiyappam-making experience.

User Journey map



In the meticulous process of refining each step of the action, a comprehensive examination has been undertaken. The outcome of this effort is the creation of a user journey map for the redesigned idiyappam maker, which is intended to guide and enhance the user experience throughout the entire process.

Mood board



Initial iterations



Prototypes



The second iteration of the redesigned idiyappam, featuring a unique and developed mechanism, reached the stage of 3D printed working prototypes. After several iterations involving mockups and scaled-down models, the working prototype was successfully crafted. However, being made of materials other than steel and

exhibiting challenges with the intended functionality of snaps, it wasn't suitable for the actual idiyappam-making process. Despite this limitation, the prototype served as compelling evidence that the devised mechanism holds promise.

Final Design



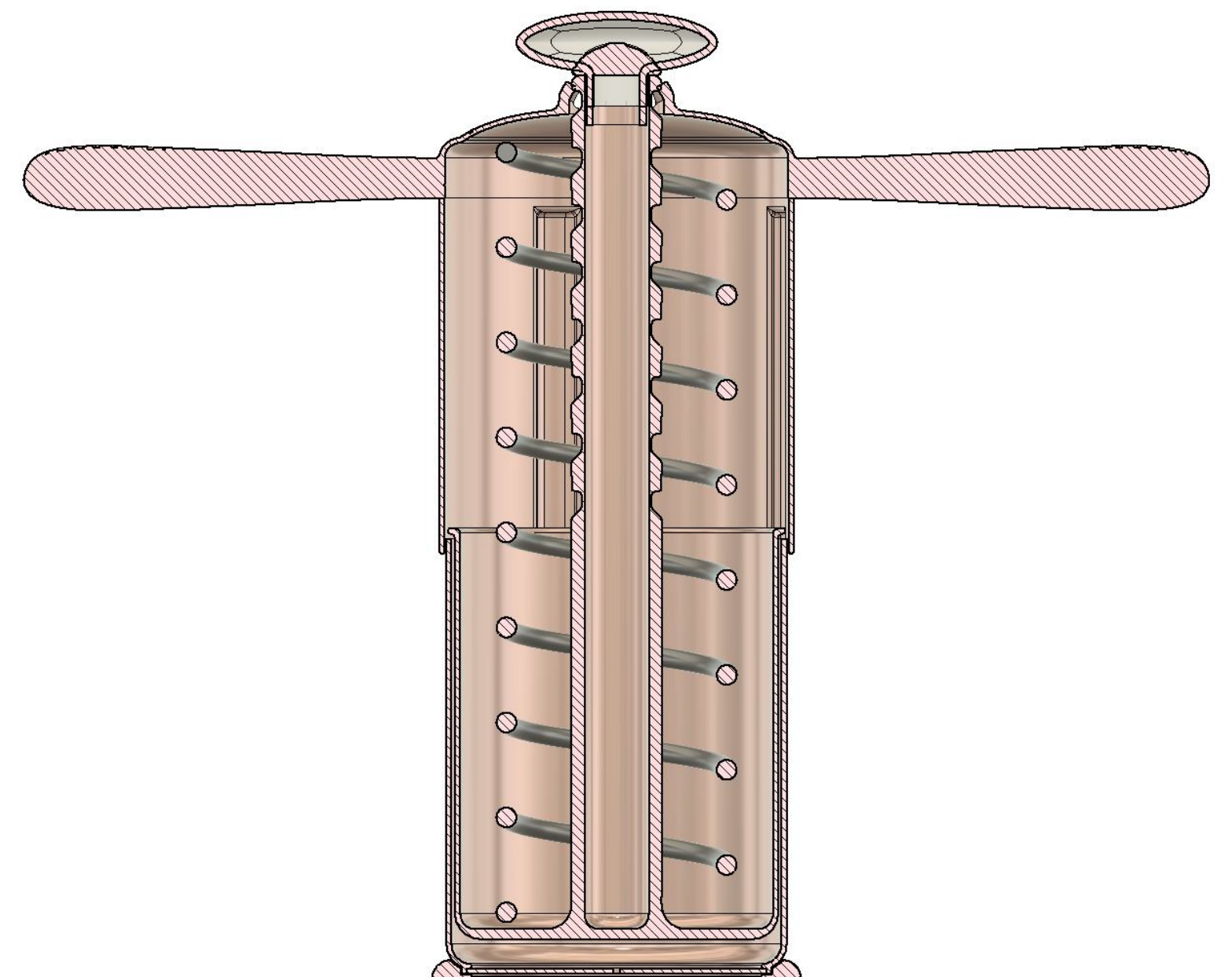
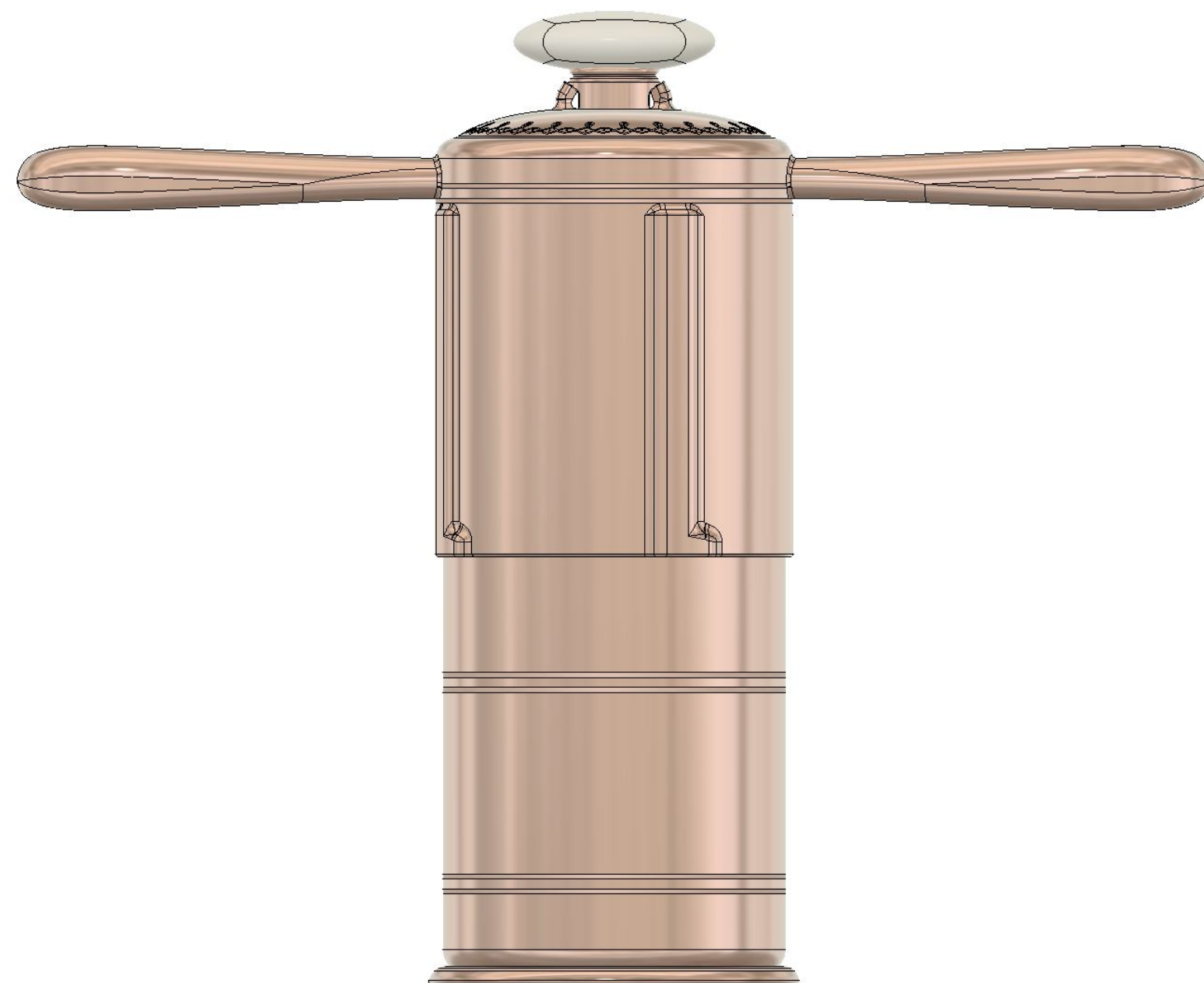
Final Design



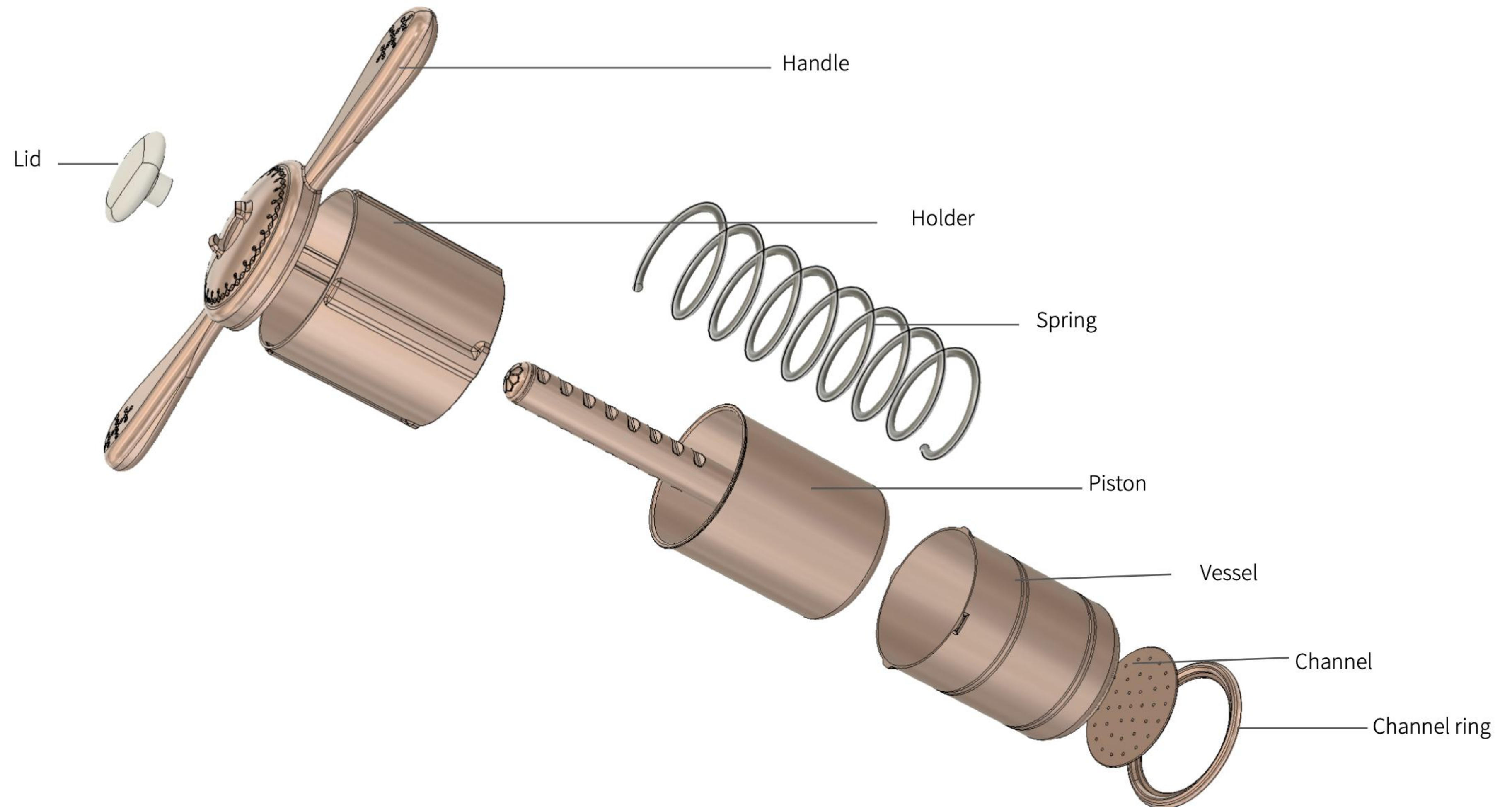
Final Design



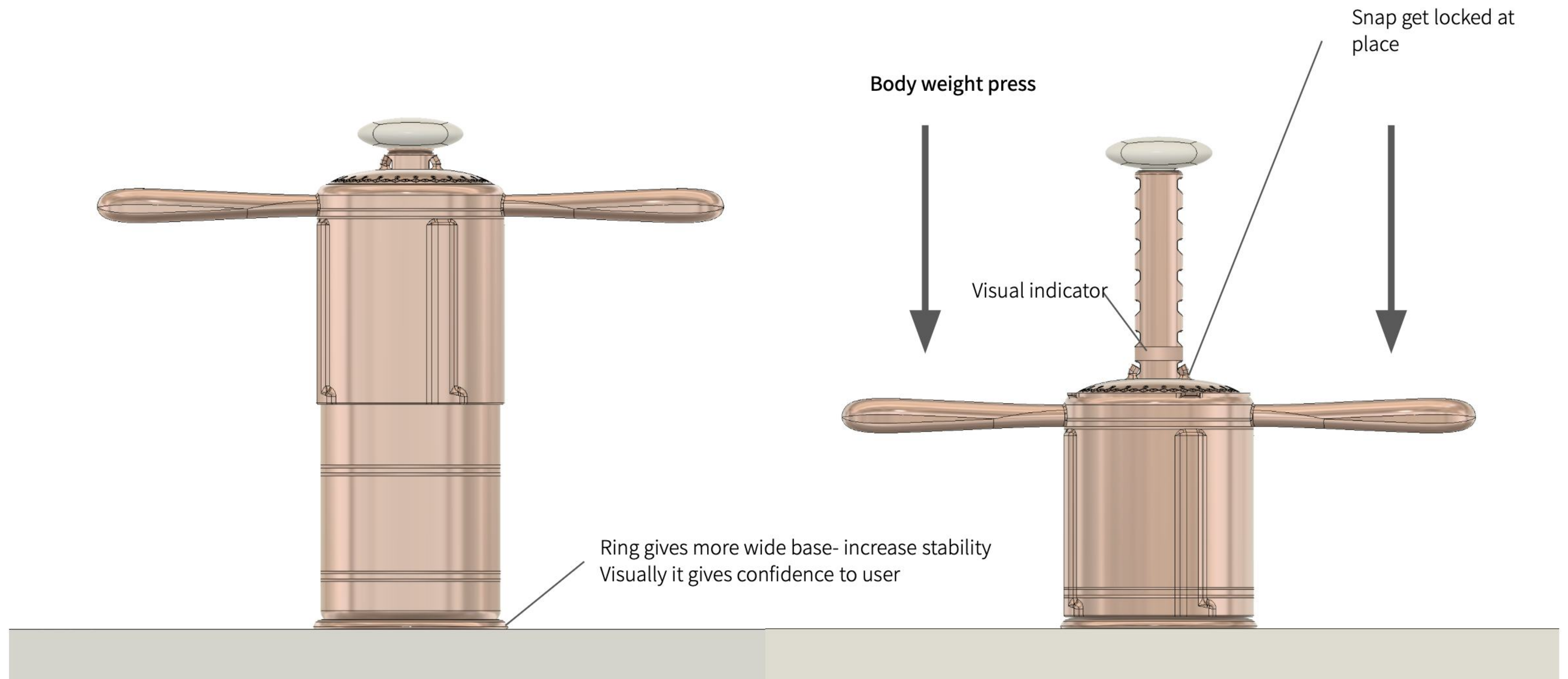
Cross section



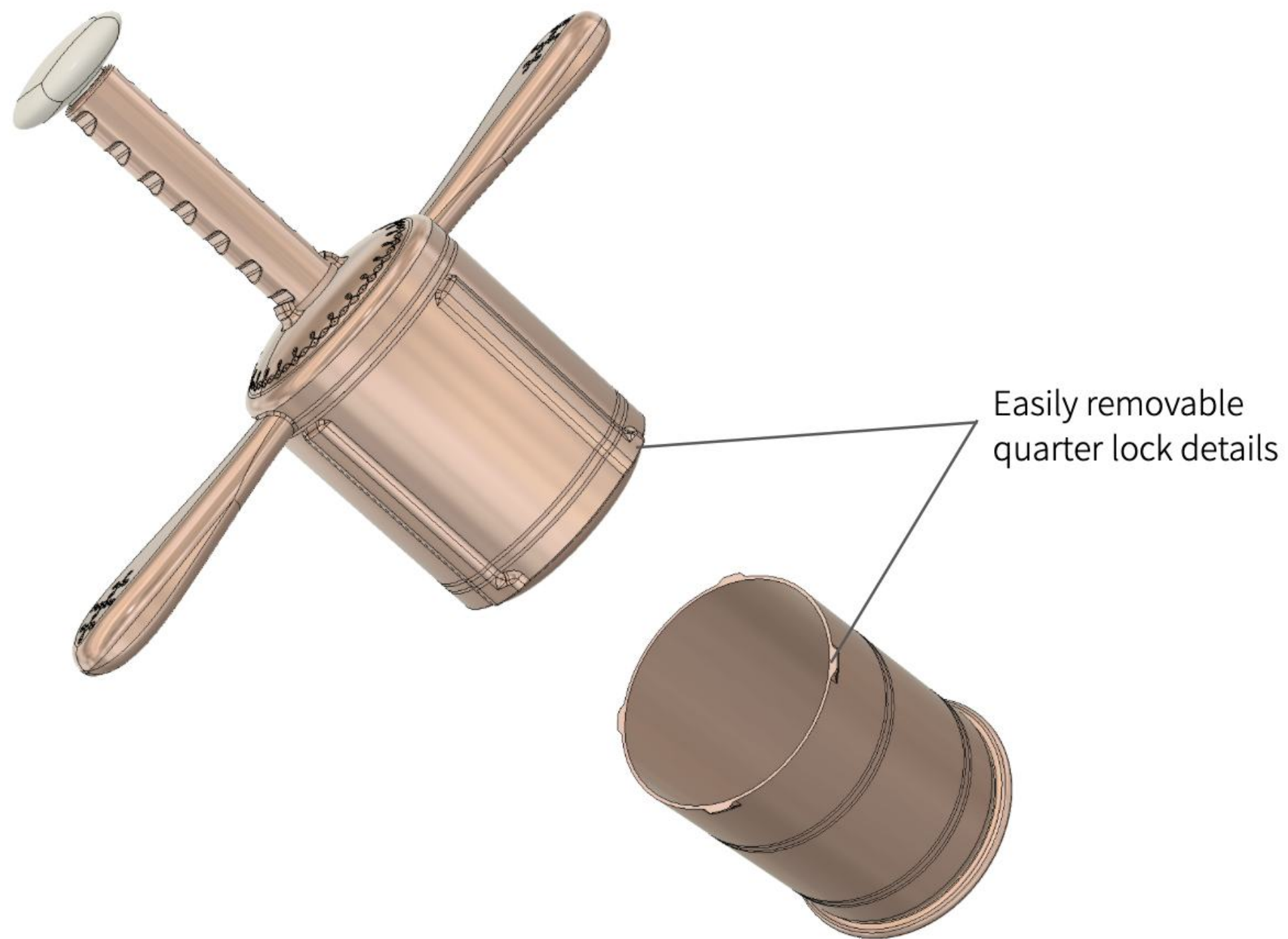
Exploded view



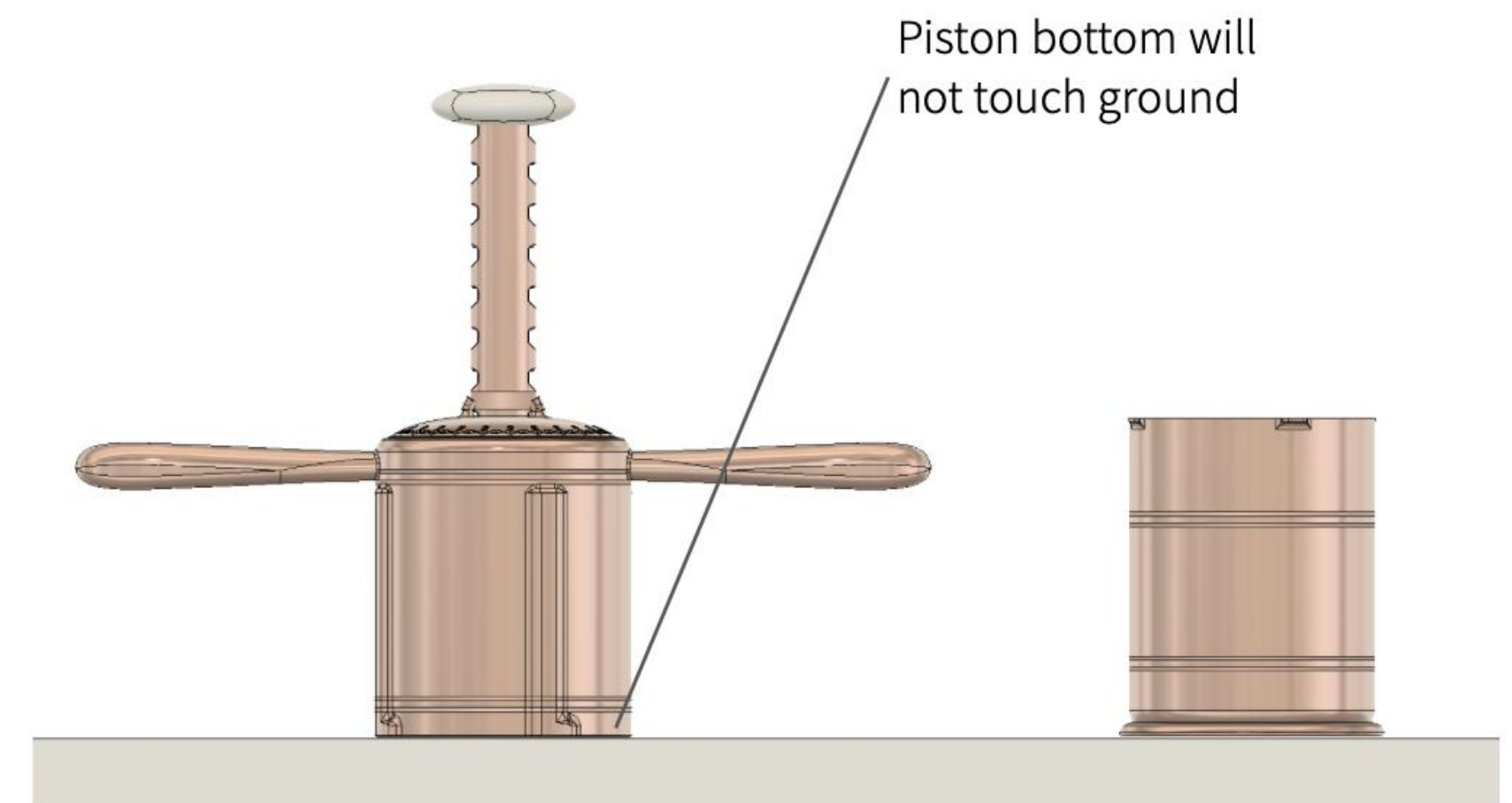
Operation



Operation



Take vessel out



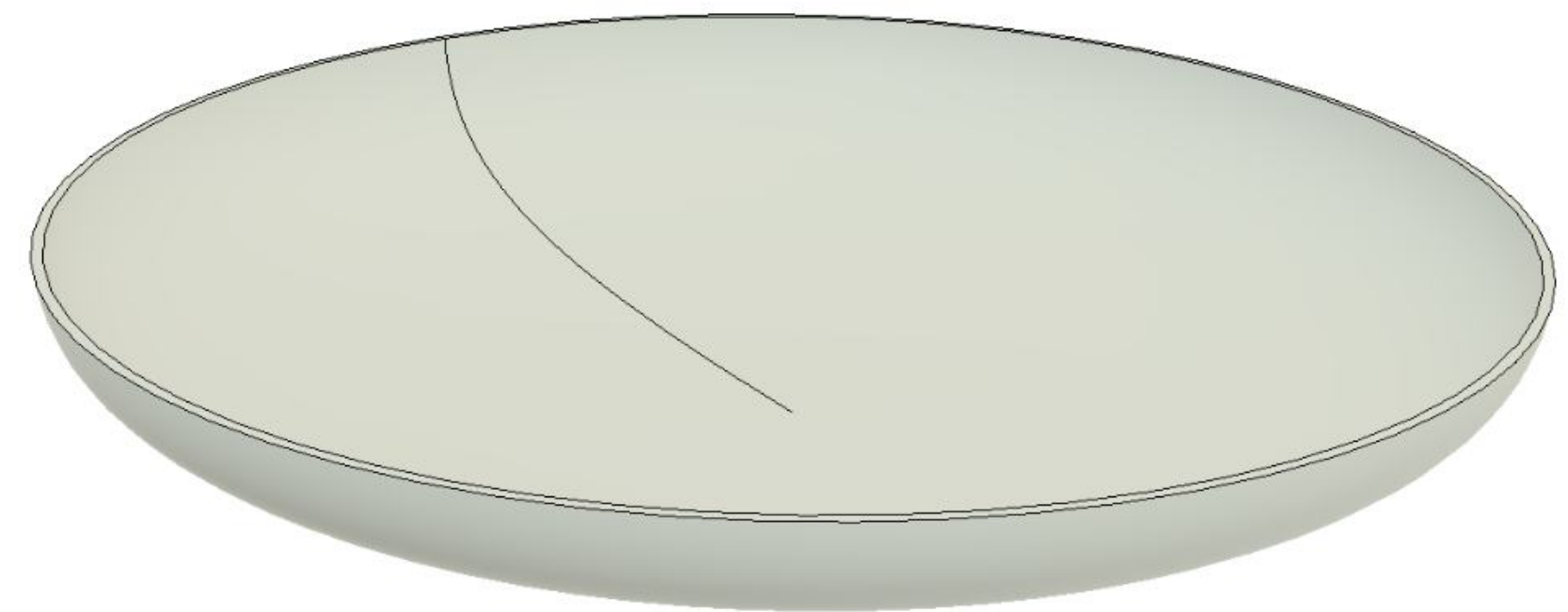
Place both on table.

Fill dough vessel

Operation

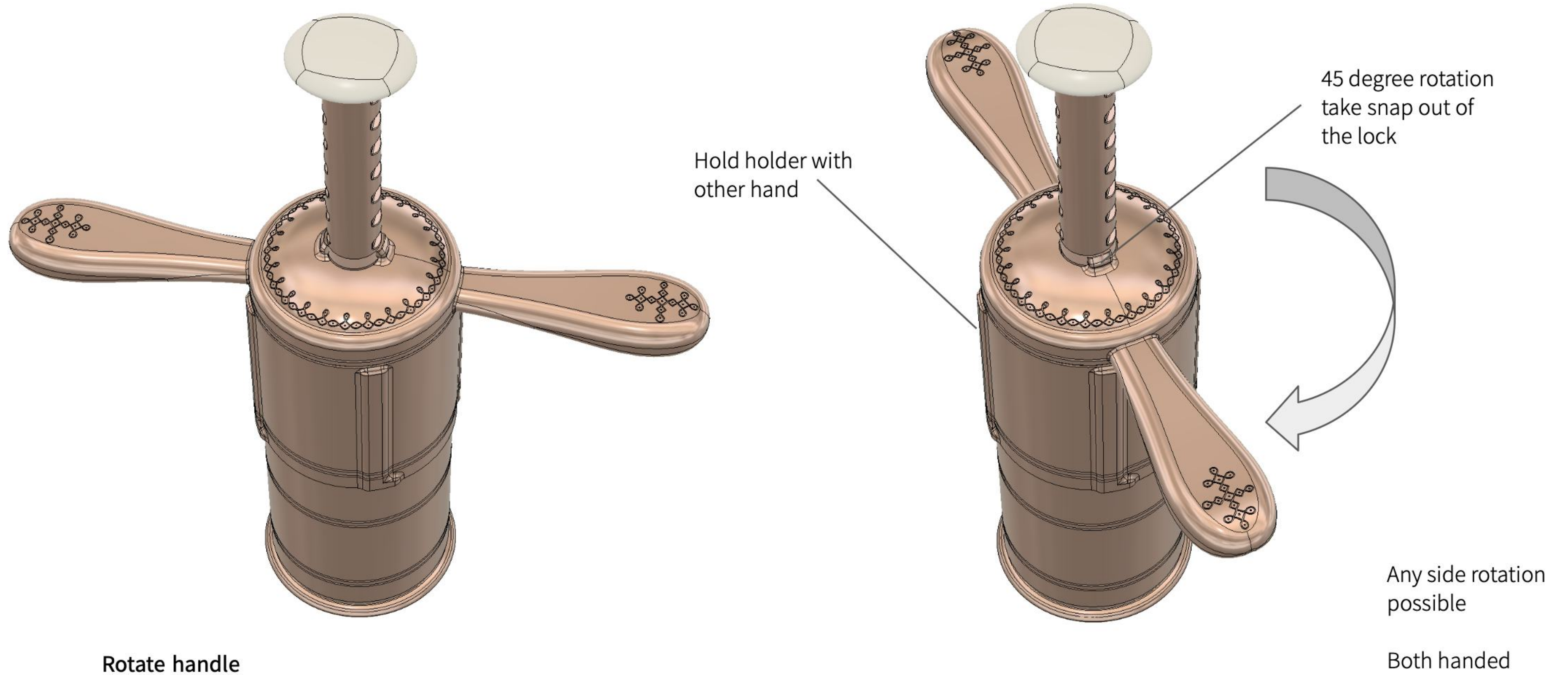


Attach vessel back



Position for making idiyappam

Operation

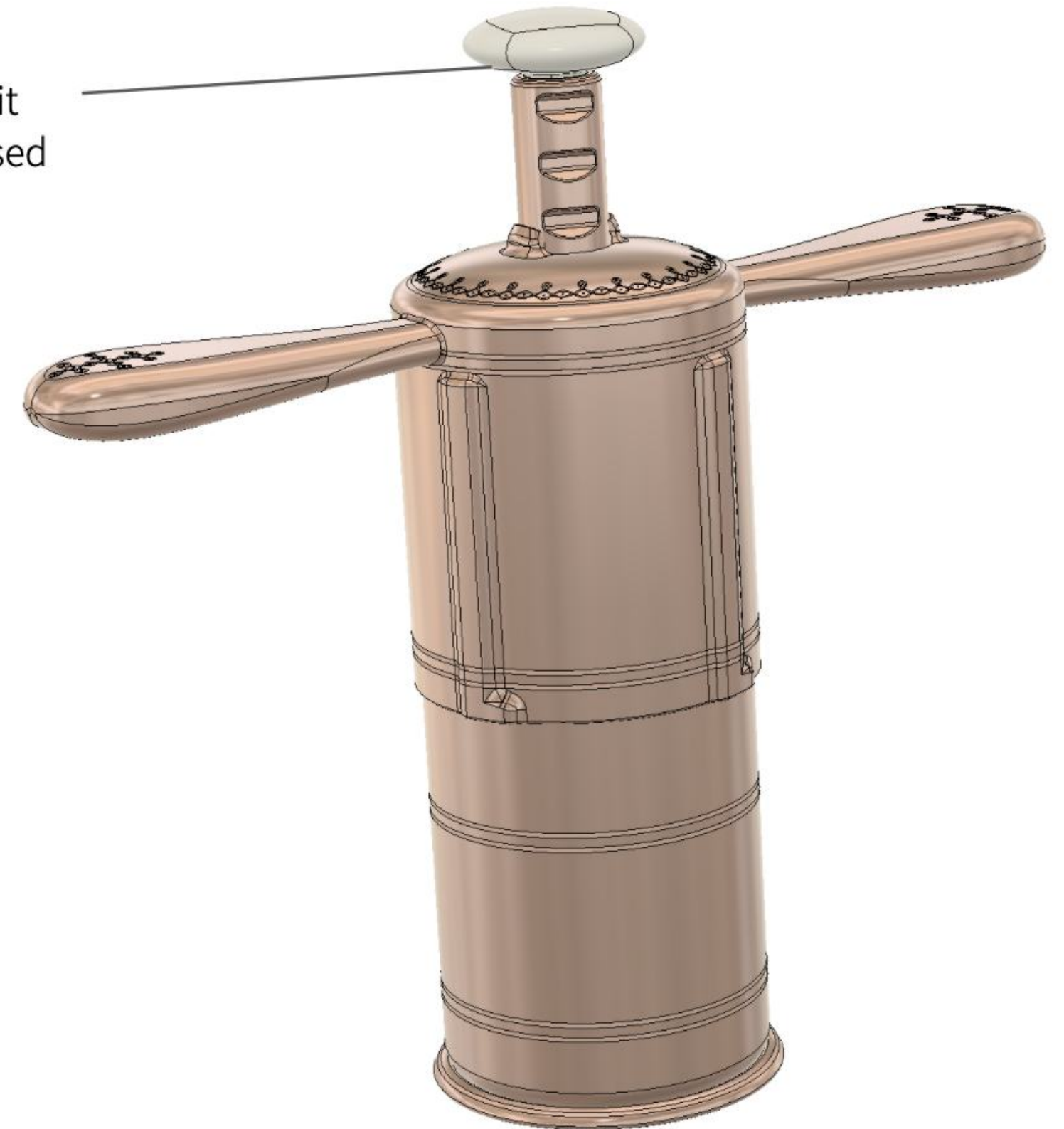


Operation



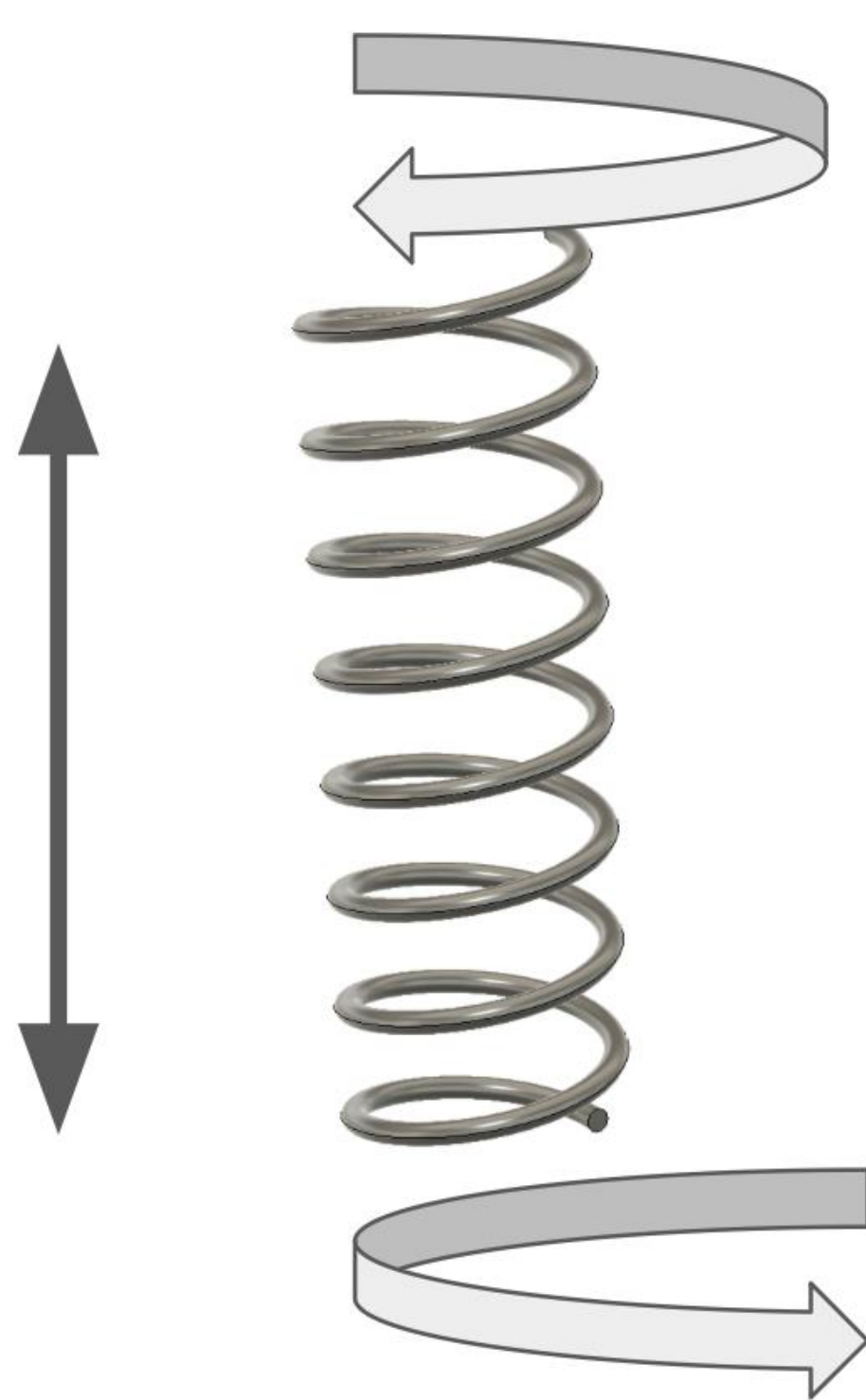
The dough gradually transforms into noodle-like strands.

When lid reaches bottom, it indicates dough fully pressed



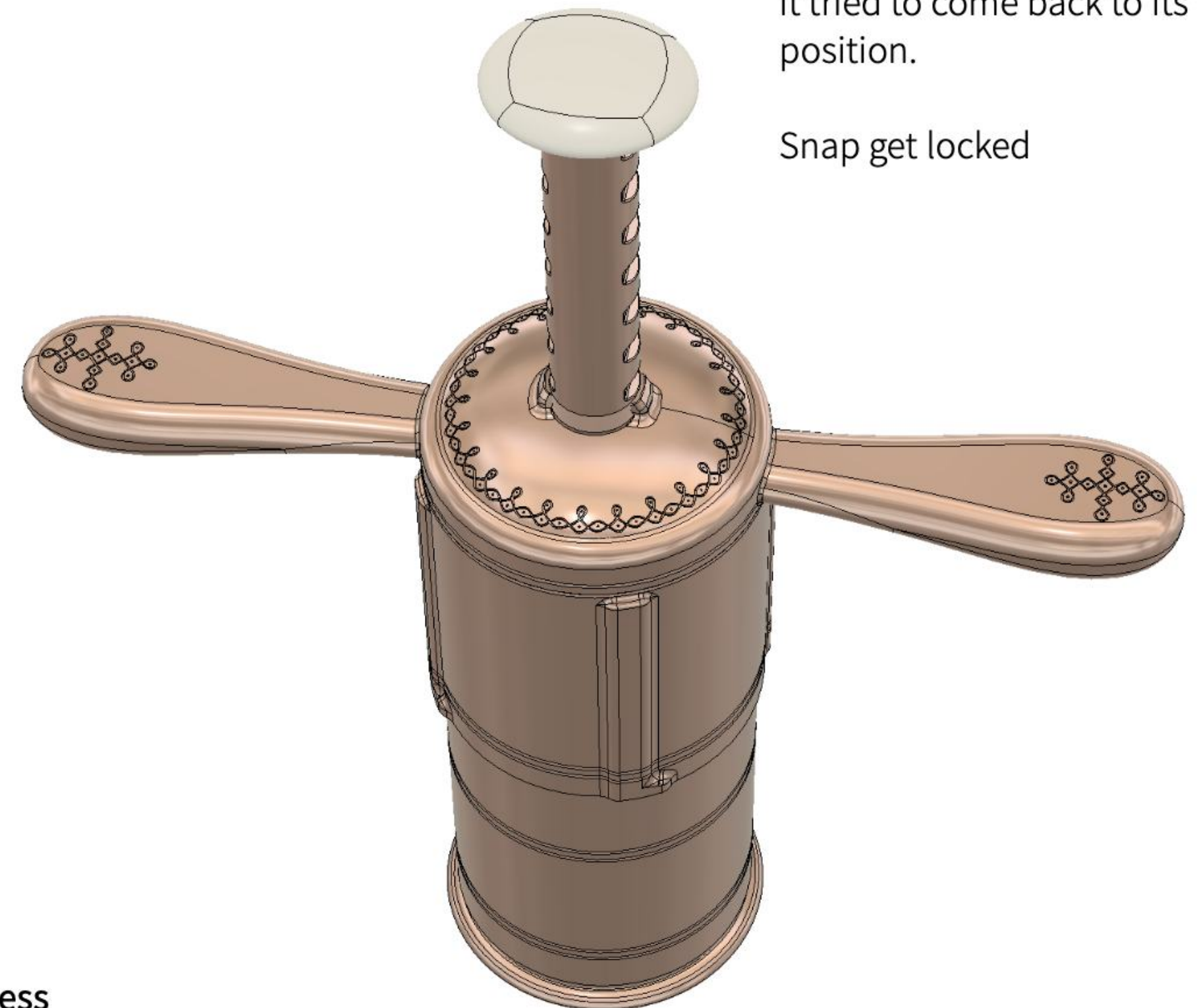
Piston slowly move down

Operation



If spring get twisted, it tries to come back to its position

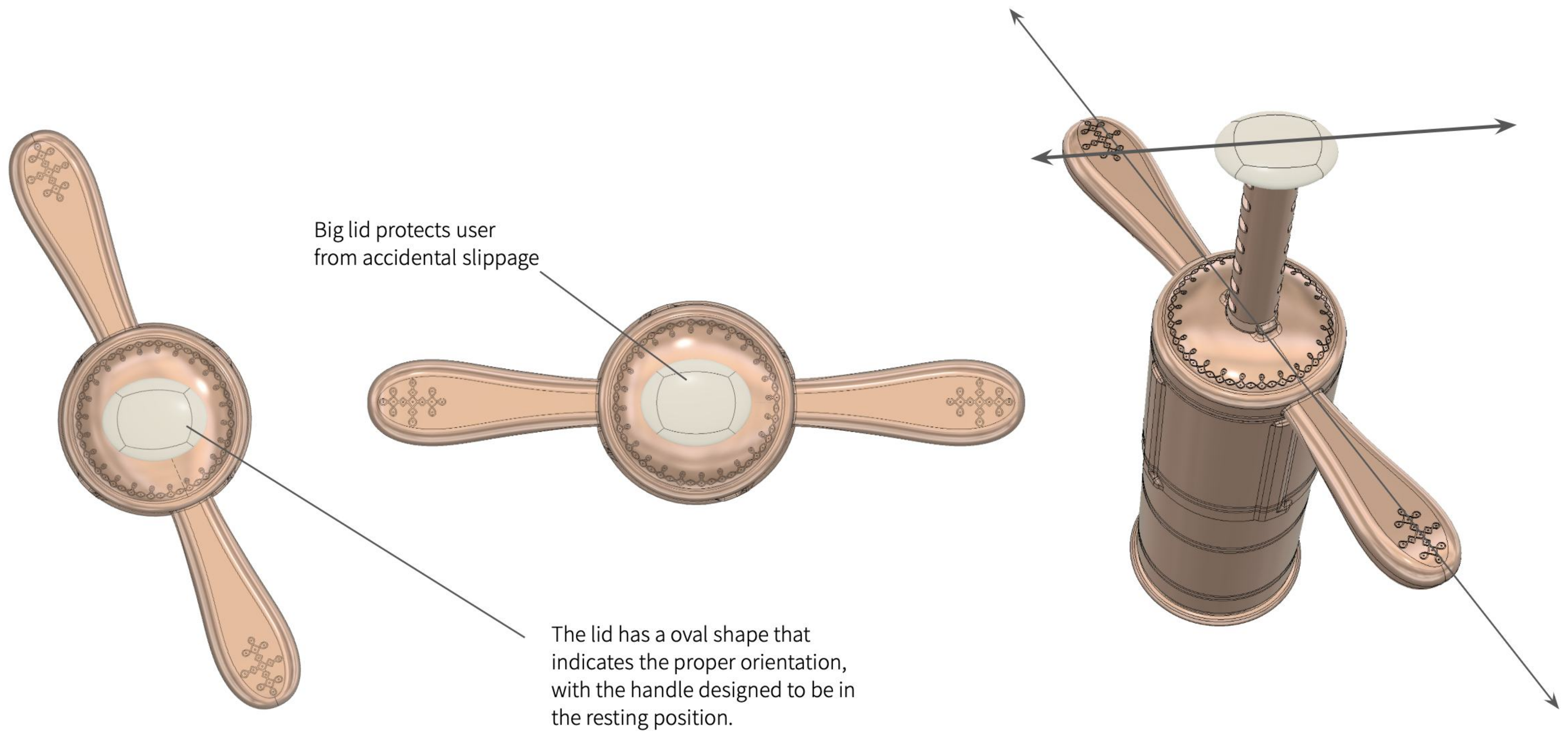
To stop the process



When the handle is released, it tried to come back to its position.

Snap get locked

Operation



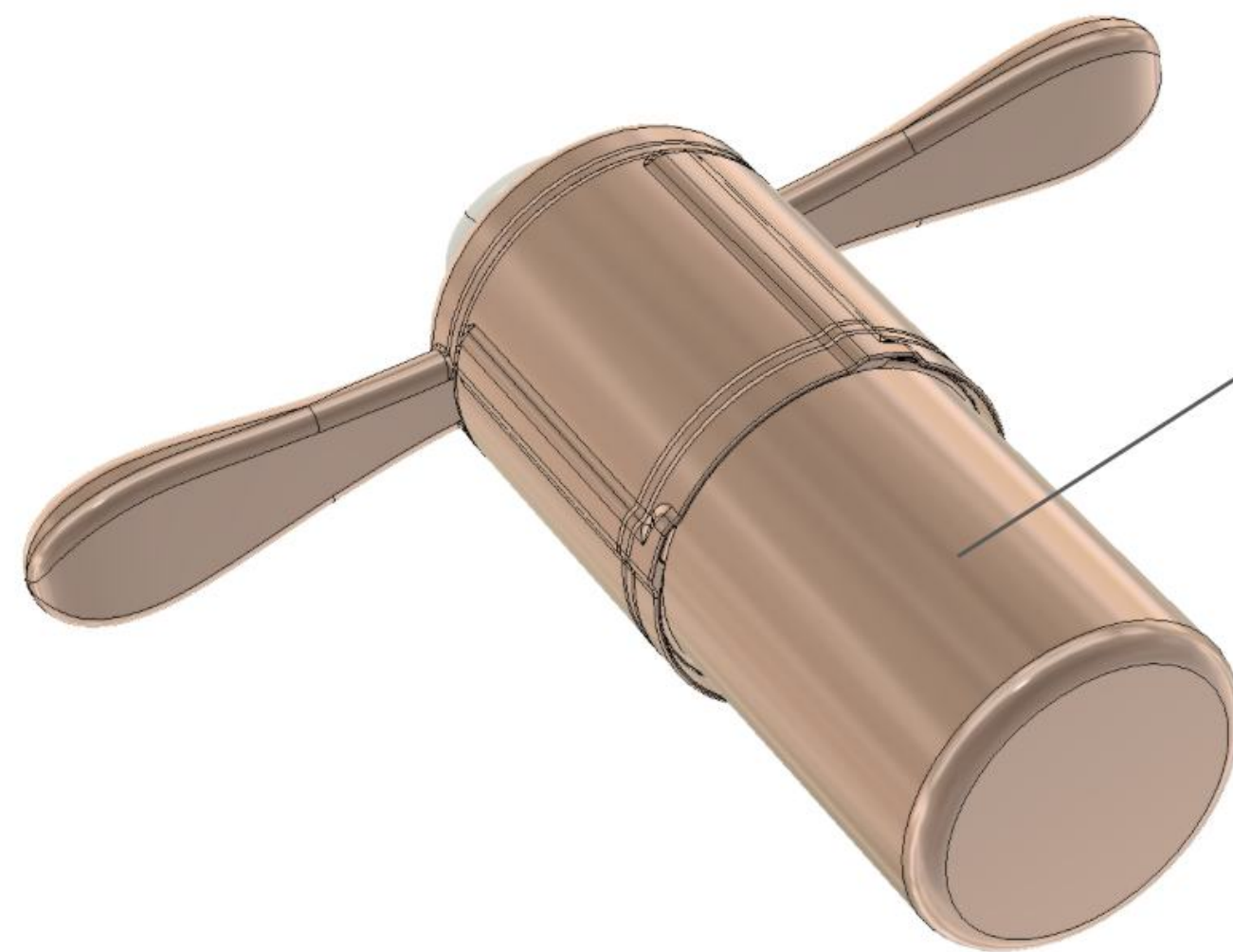
Operation



Repeat

The product is back to its original position

Cleaning



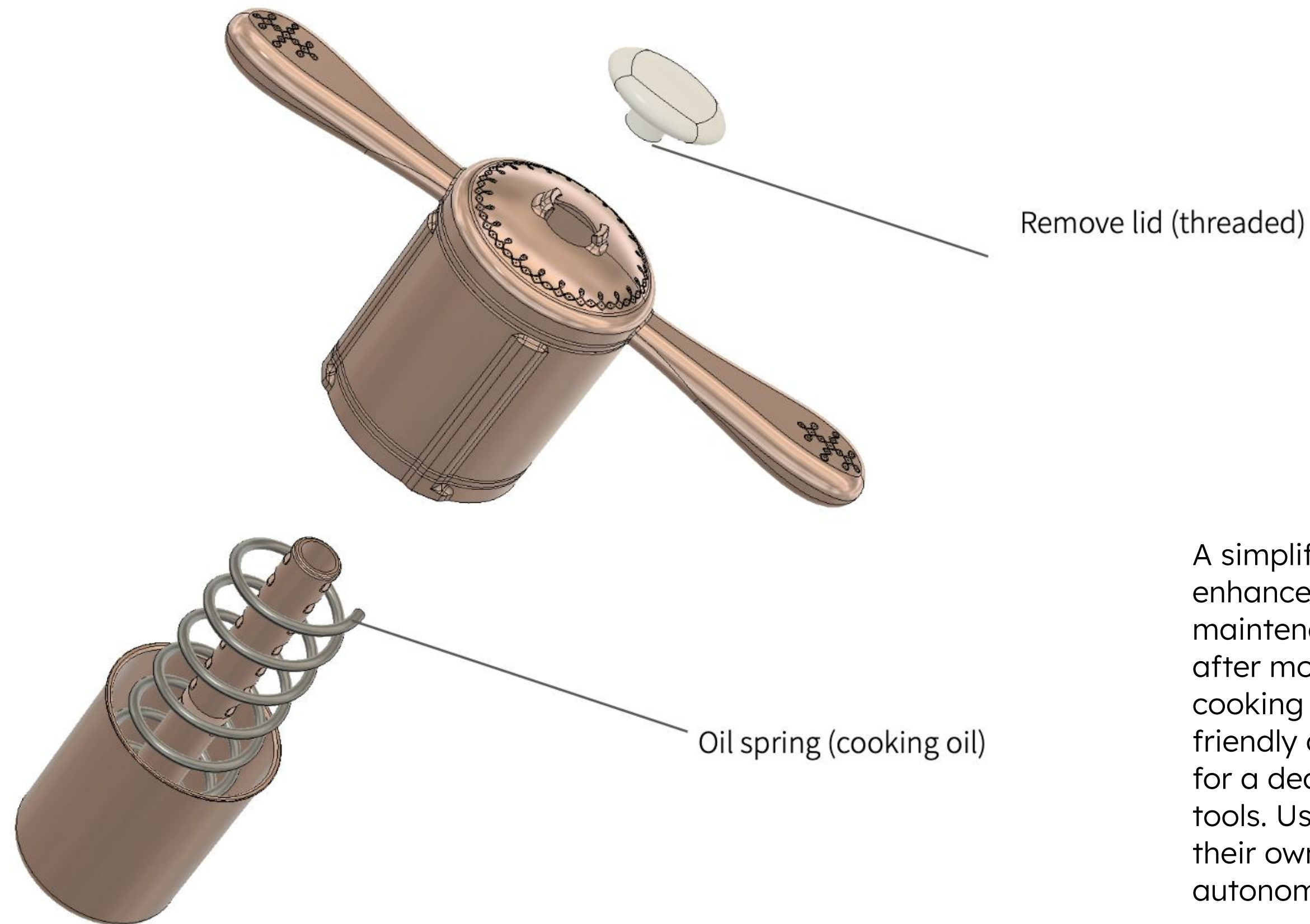
Piston get washed without dismantling



Separate out these parts and clean

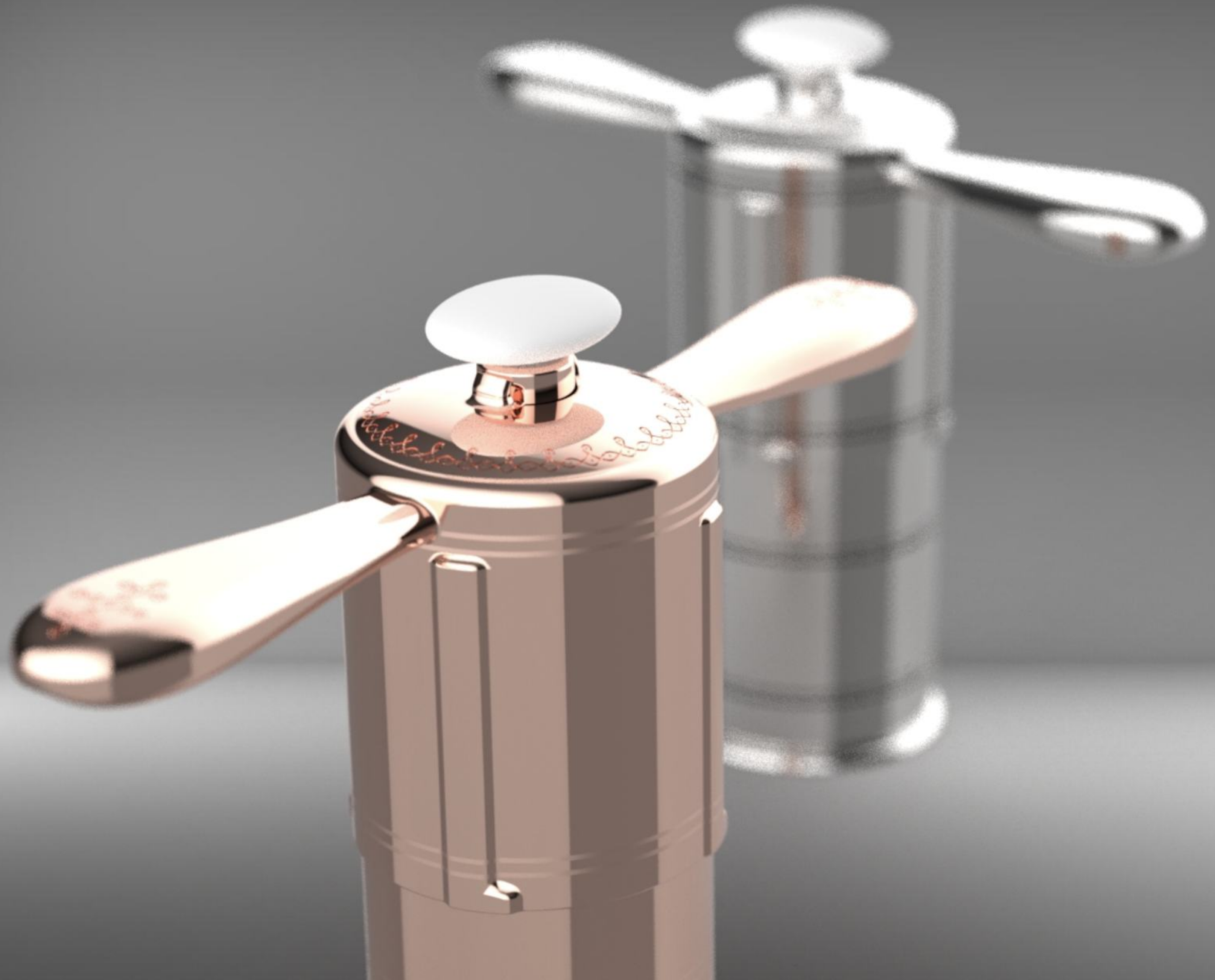
Effortless cleaning of the idiyappam maker is facilitated by the ability to remove each part separately, ensuring thorough cleaning of the vessel and channel. The piston and handle can be cleaned as a single unit, with ideally only the external surfaces requiring attention for dough residue. This design streamlines the cleaning process for users, making it notably more convenient. Furthermore, the idiyappam maker is engineered to prevent dough leakage into the spring area. In the rare instance of such an occurrence, users can easily dismantle and reassemble the device themselves.

Maintenance



A simplified mechanism with fewer components not only enhances ease of use but also facilitates straightforward maintenance. The spring, requiring occasional lubrication after months of use, can be easily addressed using cooking oil. Importantly, the device is designed for user-friendly dismantling and reassembly, eliminating the need for a dedicated maintenance professional or specialized tools. Users can effortlessly perform maintenance tasks on their own, contributing to the overall accessibility and user autonomy of the idiyappam maker.





Conclusion

This industrial design project successfully reinvented the traditional idiyappam maker, addressing usability challenges and enhancing the overall user experience. By preserving traditional methods while incorporating modern design principles, the redesigned idiyappam maker offers improved mechanism efficiency, stability, and seamless dough feeding. Innovative features like body weight assistance and controlled mechanical energy usage effectively minimize user effort and fatigue, making the culinary process more enjoyable and efficient. Through extensive user research, interviews, and usability testing, the project developed a versatile and accessible kitchen tool tailored for South Indian households, representing a significant advancement in traditional culinary tools through meticulous industrial design.

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<https://peppertrail.com/culinary-connections-between-south-india-and-southeast-asia/>