

Device and software enabled method for low temperature cooking control system and food safety monitoring and validation system

ABSTRACT

The device and software enabled method together provide a real time food safety validation system, and programmed control system for low temperature cooking devices. The device is governed by software, and together the device and the software control, record and validate food safety during low temperature cooking processes. The system includes: real-time validation of low temperature cooking pathogen log reduction as per government safety standards; online food safety and recipe formulation data storage; smart phone or tablet enabled user interface for processor module control; a programmable control for the processor module; inputs for one or more temperature sensor element for providing a temperature signal indicative of internal product temperature, and/or cooking medium temperature; a programmable control that is coupled to the user interface for the application of cooking programs that are stored in the associated online database; a processor module that is coupled to the temperature sensor element for receiving the temperature signal from product temperature and ambient temperature; a processor module that enables control of the heating element for regulating the temperature of cooking medium.

DESCRIPTION

Device and software enabled method for low temperature cooking control system and food safety monitoring and validation system

FIELD OF THE INVENTION

The invention relates generally to low temperature cooking and more specifically to programmable control and safety validation for low temperature cooking, particularly to sous-vide cooking control, safety monitoring, safety validation.

The invention is developed primarily for commercial, low temperature cooking with pre-set cooking program(s) to control temperature, food safety temperature monitoring and food safety validation. In addition to commercial application, the invention is applicable for domestic low temperature cooking device control and temperature monitoring, and food safety validation.

BACKGROUND OF THE INVENTION

Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of the common general knowledge in the field.

Low temperature cooking is cooking at temperatures that require an extended hold time of 1 minute or more to reach a full kill 6.5 D reduction of pathogens. As higher cooking temperatures are reached pathogens are reduced at a faster rate until an "instant kill" temperature is reached. When cooking at lower temperatures, in order to ensure pathogens are reduced to appropriate levels, minimum hold times must be maintained. The lower the cooking temperature, the longer the minimum hold time. This time and temperature varies with the type of product cooked. Furthermore, industry often implements much longer cook times, often in excess of 48 hours, in order to change the texture of food. Low temperature cooking increasingly popular, both commercially and domestically, and is often implemented via sous vide cooking, or sometimes via low temperature poaching with flavoured fat or broth. Used commercially, this method of cooking currently requires validation with temperature loggers and probes tracking product and water temperatures. Operators must manually download and review data against time/temperature regulations set out by the local health authorities. This is time consuming and it requires expertise. Furthermore, as previously mentioned, and unrelated to safety, for culinary reasons low temperature cooking often requires different cooking temperatures in stages over an extended period of time. The temperature changes correlate to the internal temperature on the product being cooked and the desired final temperature. There is a wide range of set points and recipes used to achieve different results.

Because of the complexity of the safety validation and the difficulty of monitoring extended cook times, it is advantageous to have a device that monitors internal product temperature, and validates

automatically the safety of the food once the minimum hold time is met. Because of the evolving knowledge of the relationships between time and temperature for pathogen log reduction it is advantageous to have the validation system controlled by a program that can receive instant updates. Because of the need for stage cooking/temperature changes based on the internal product temperature over an extended period of time, it is advantageous for the program to control the cooking device.

It is the object of the invention to overcome at least one of the disadvantages of the process and to facilitate sound food safety and sound culinary cooking processes.

It is an object of this invention in its preferred form to provide time and temperature monitoring and food safety validation to existing cooking devices.

It is an object of this invention in its preferred form to provide an external control and user interface for existing cooking devices.

It is an object of this invention to provide a device that can be built in by other manufacturers to existing cooking devices and thus linked with the software enabled method to become a low temperature cooking control, monitoring and validation system.

SUMMARY OF THE INVENTION

According to an aspect of the invention there is provided a device and software enabled method for time/temperature monitoring, data storage, safety validation, and process control of low temperature cooking processes using a multitude of existing cooking devices. This device and software enabled system includes:

An App that enables any smart device (smart phone or tablet) to act as an HMI (Human Machine Interface) for the controls;

An automated system of food safety validation for low temperature pathogen log reduction, according to regulatory standards;

An online storage system of time and temperature records;

A programmable control for the processor module with inputs for one or more temperature sensor elements;

A programable control that is controlled by a user interface, receiving user inputs either manually or from downloadable programs from the online database;

A software application/HMI for controlling, displaying, recording and validating food safety for low cooking times and temperatures (low temperature cooking);

Two temperature sensor elements for providing a temperature signal indicative of internal

product temperature and cooking medium temperature;

A processor module that is coupled to the user interface for receiving user inputs;

A processor module that is coupled to the temperature sensor element(s) for receiving the temperature signal(s);

A processor module that enables control of the heating element of the existing cooking device to which is connected Via the software application/HMI, and based on user input or program download, the processor determines a cooking program comprising a plurality of cooking temperatures each having a respective relationship to internal temperature and program set points.

In the drawings, which form a part of this specification,

Fig. 1 shows the process of logging into the app and arriving at the home screen

Fig. 2 shows the process of selecting "My Recipes" from the home screen and arriving on a recipe page

Fig. 3A shows the process of selecting "Find Recipes" from the home screen and arriving on a search by selection page

Fig. 3B shows the process of selecting "Protein" from search selection page with search results for "Beef"

Fig. 3C shows the process of selecting "Ethnic Flavour" from search selection page with search results for "Western"

Fig. 3D shows the process of selecting "Chefs" from search selection page with sculling search results

Fig. 3E shows the process of selecting "What's Popular" from search selection page

Fig. 3D shows the process of selecting "Sous Community" from search selection page

Fig. 4A shows the process of selecting "Create Recipe" from the home screen and arriving at "Cooking Stages" pop up window

Fig. 4B shows the continuation of the process for "Create Recipe" from the "Cooking Stages" window to arrive at the "Dashboard".

Fig. 5A shows the process of selecting "Dashboard" from the home screen to arrive at "Short Ribs" recipe page

Fig. 5B shows the process of "Running Program" which controls the external device and gives real-time feedback on the "Run Program" and "Cooking Stages" screens

Fig. 5C shows the process of creating more "Dashboards" which can be connected to multiple devices

Fig. 6 is a view of the device and how it is connected to the bluetooth circuit board and power sources

Fig. 7 is the the electrical connectivity diagram for the device

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferably, the device and software enabled method is used as an external control, monitoring and validation tool for low temperature cooking. More preferably, the device and software enabled method is used as an external control, monitoring and validation tool for existing low temperature cooking devices using the internal PID control and relay to bypass and control electrical current to cooking element. More preferably the device is installed by the manufacturer of an existing low temperature cooking device as an HMI that enables program/recipe downloads for low temperature cooking. More preferably the device and software enabled method is used with existing sous vide cooking devices. More preferably the device and software enabled method is used with existing slow cooking devices. More preferably the device and software enabled method is used with existing rice cooker devices. More preferably the device and software enabled method is installed and used with existing emersion circulators. More preferably the device and software enabled method is installed and used with existing hot water bath devices. More preferably the device and software enabled method is installed and used with existing soup warmer devices.

Preferably, the user interface enables the user to log-on to an online account using a smart phone, tablet, or touch screen interface (FIG 1), and selects from "My Recipes" (FIG 2) "Find Recipes" (FIG 3a-f) or "Create Recipes" (FIG 4a-b). Programs/recipes are queried according to different search criteria based on popularity ratings (FIG 3e), protein type (FIG 3b), taste profile (FIG 3c) , specific user's recipes (FIG 3d), source (FIG 3f), quality rating (FIG 3e).

Preferably, the user selects program/recipe from "My Recipes" (FIG 5a) and runs the program (FIG 5b) on cooking device controller. More preferably the user creates recipe (FIG 4a-b) by manually entering settings and saving data to create a new recipe. More preferably this recipe can be made available to online community of device users. More preferably the user can make recipes private or send invitations to specific users only.

Preferably, the system displays real time charts of cooking time and temperature (FIG 5b, 61). More preferably system sends pop up validation messages to user display screen of food safety validation once reached.

Preferably, the system sends time and temperature cooking data automatically to online storage for food safety record keeping purposes once process is complete and food safety has been validated. More preferably, the system sends time and temperature recorded data to online storage once the user attempts to end program.

CLAIMS

1. A method for programmable control for low temperature cooking processes and a method for food safety validation by way of software enabled device, including: a software for controlling, recording and validating food safety cooking time and temperatures according to government standard and most current accepted scientific knowledge on pathogen log reduction; online data storage; real-time validation of low temperature cooking pathogen log reduction according to government food safety standards; a software application user-interface that enables any smart phone or tablet to control the device that in turn controls the processor module in other existing devices, and displays real time temperature time and temperature charts and set program parameters; a programmable control for the processor module; inputs for one or more temperature sensor element for providing a temperature signal indicative of internal product temperature, and/or cooking medium temperature; a programmable control that is coupled to the user interface for the application of cooking programs that are stored in the associated online database; a processor module that is coupled to the temperature sensor element for receiving the temperature signal from product temperature and ambient temperature; a processor module that enables control of the heating element for regulating the temperature of cooking device and its contents; a processor module wherein the control for the processor module downloads instructions from the software application/HMI; and wherein, based on the program selected, the processor determines a cooking profile comprising a plurality of cooking temperatures each having a respective set point relative to the internal temperature of food product and software application/HMI program download instructions.
2. The program according to claim 1, the program including: a series of validation timers beginning once minimum temperature is met and ending either once the minimum length of time is met or once temperature drops below timer set point,
3. The program control according to claim 2, wherein: multiple timers simultaneously record the time at which each temperature reached and held thus sends validation notice to HMI once one of the timers has reached minimum hold time without interruption or drop of temperature.
4. The program according to claim 3, records all time and temperature and sends time and temperature records to online storage.
5. The program according to any one of claims 2 to 4, wherein: if minimum temperature is never met or if temperature drops below critical limit, then safety validation is not sent to user. Instead low temperature warning is sent.
6. The user interface according to claim 1, wherein: the user inputs selected food type and validation is based on appropriate food safety log reduction 6.5D minimum hold time and temperatures.
7. The software application according to claim 1, wherein: the user interface enables user to select from online database of programs and to download desired program (also known as recipe) to control the device processor module.

PATENT CITATIONS

Cited Patent	Publication date	Filing date	Applicant	Title
WO 2011031306 A3	September 8, 2010	February 9, 2012	Eades Daniel J, Eades Mary Dan M D, Eades Michael R, Lamson Robert D, Richard Miles	Sous- vide cooker
WO 2013130798 A1	28-Feb-13	6-Sep-13	Nomiku Inc.	Apparatus and system for low-tem- peraturecooking
WO 2001084446 A1	3-May-01	8-Nov-01	Nancy Elizabeth Barton, John William Carbone, Brackett Badger Den- niston Iii, Gen Electric Capital Corp, Edward Scott Gilbert, Robert Charles Green, William Lacey, Eugene F Mensch- ing Jr, Chris- tina Elizabeth Mitchell, Christo- pher Robine, Frank Torres Iii, David Emerson Tucker, Ligia Barbosa Vicente, Sheri Fish West, John Whitcomb	ethods and systems for compliance program assess- ment
MWO 2014019018 A1	31-Jul-13	6-Feb-14	Breville Pty Limited	Sous vide device

Figure 1

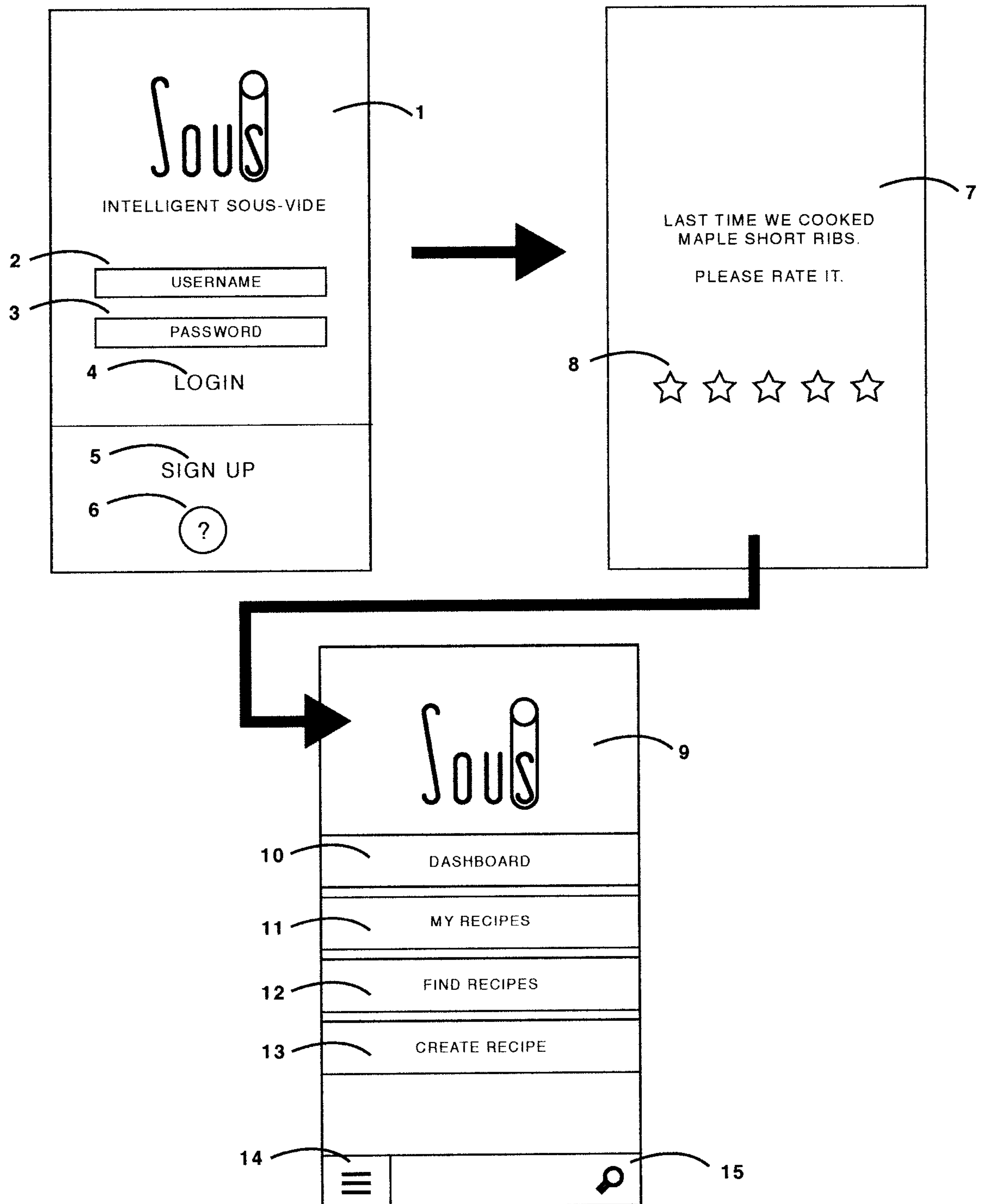


Figure 2

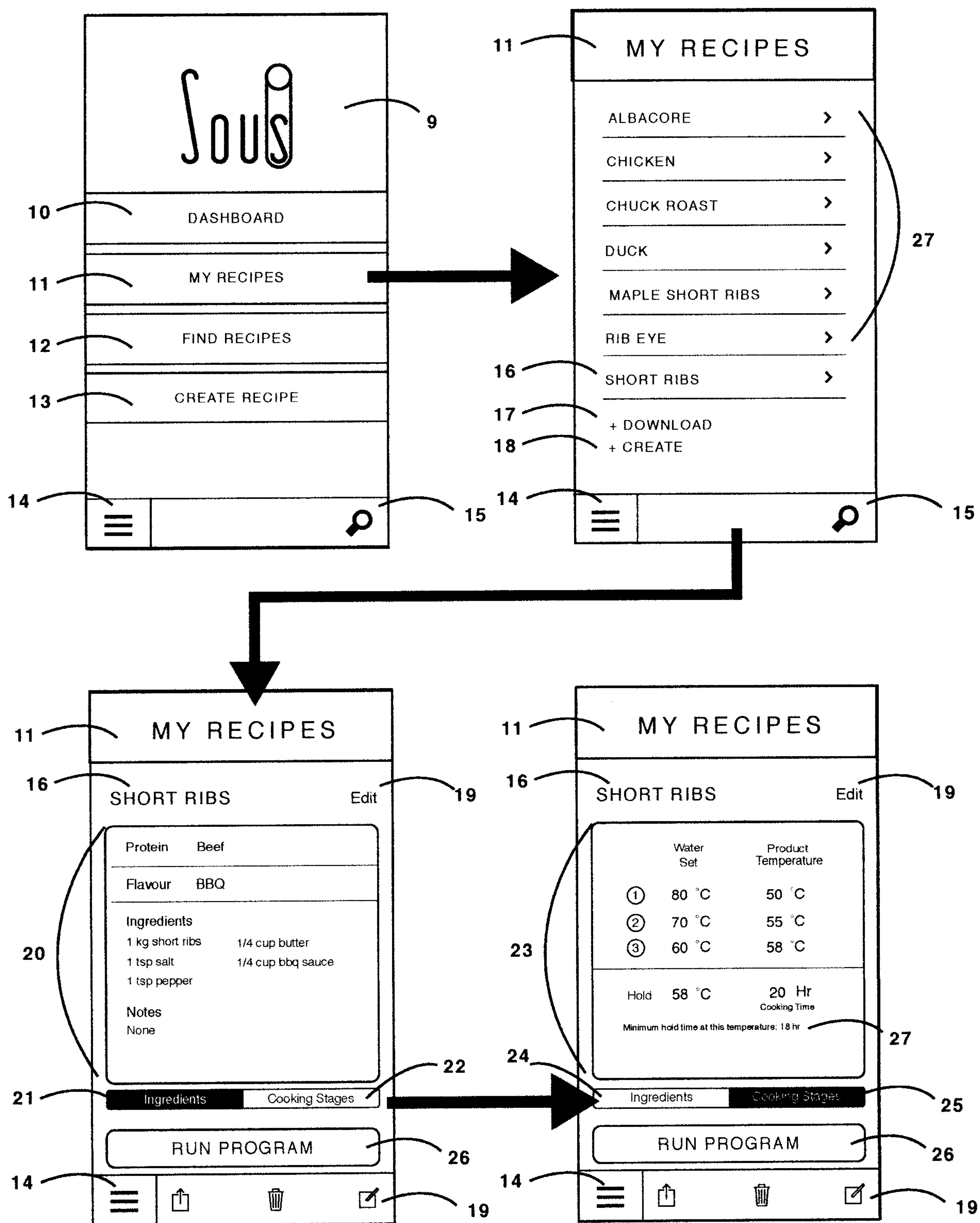


Figure 3a.

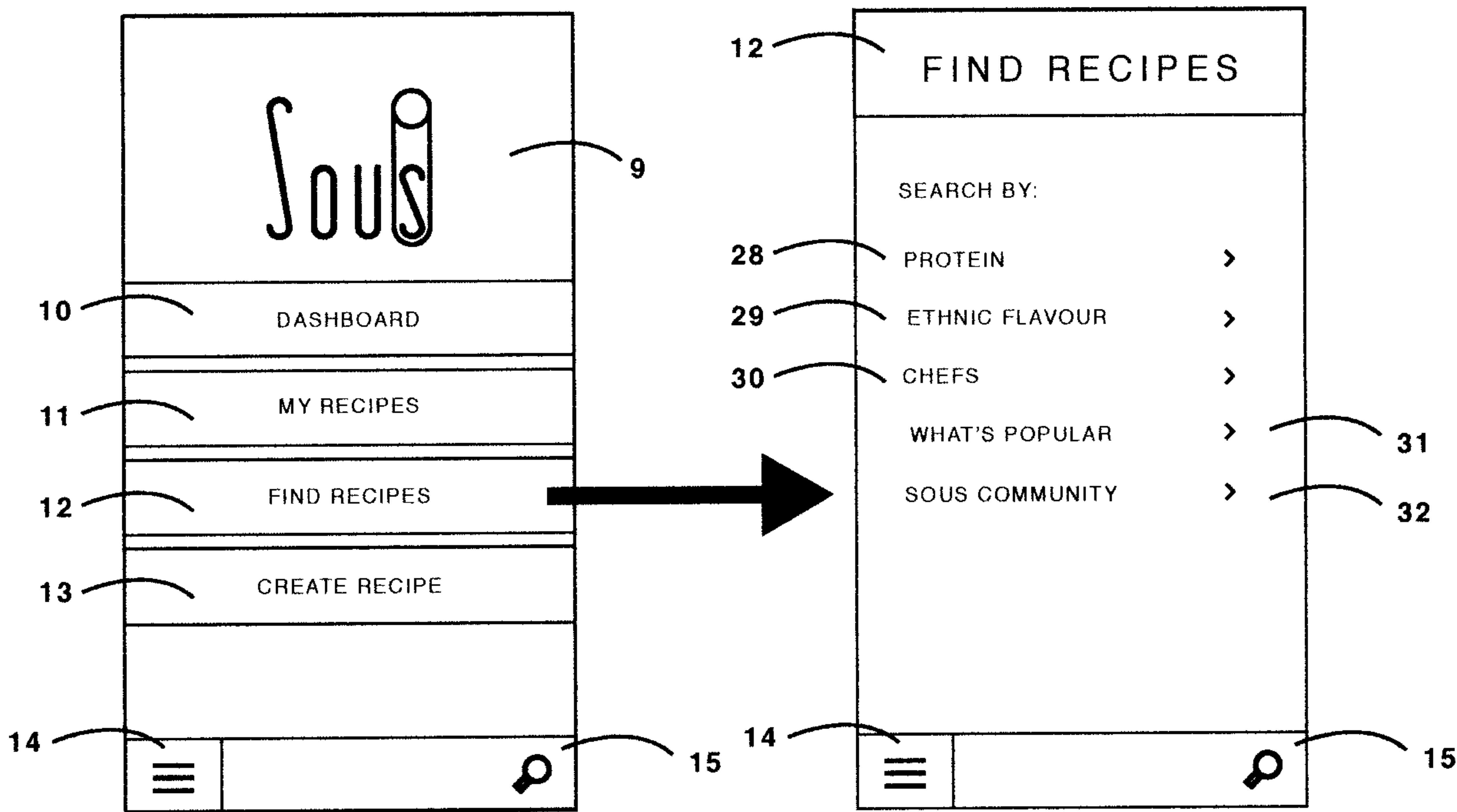


Figure 3b.

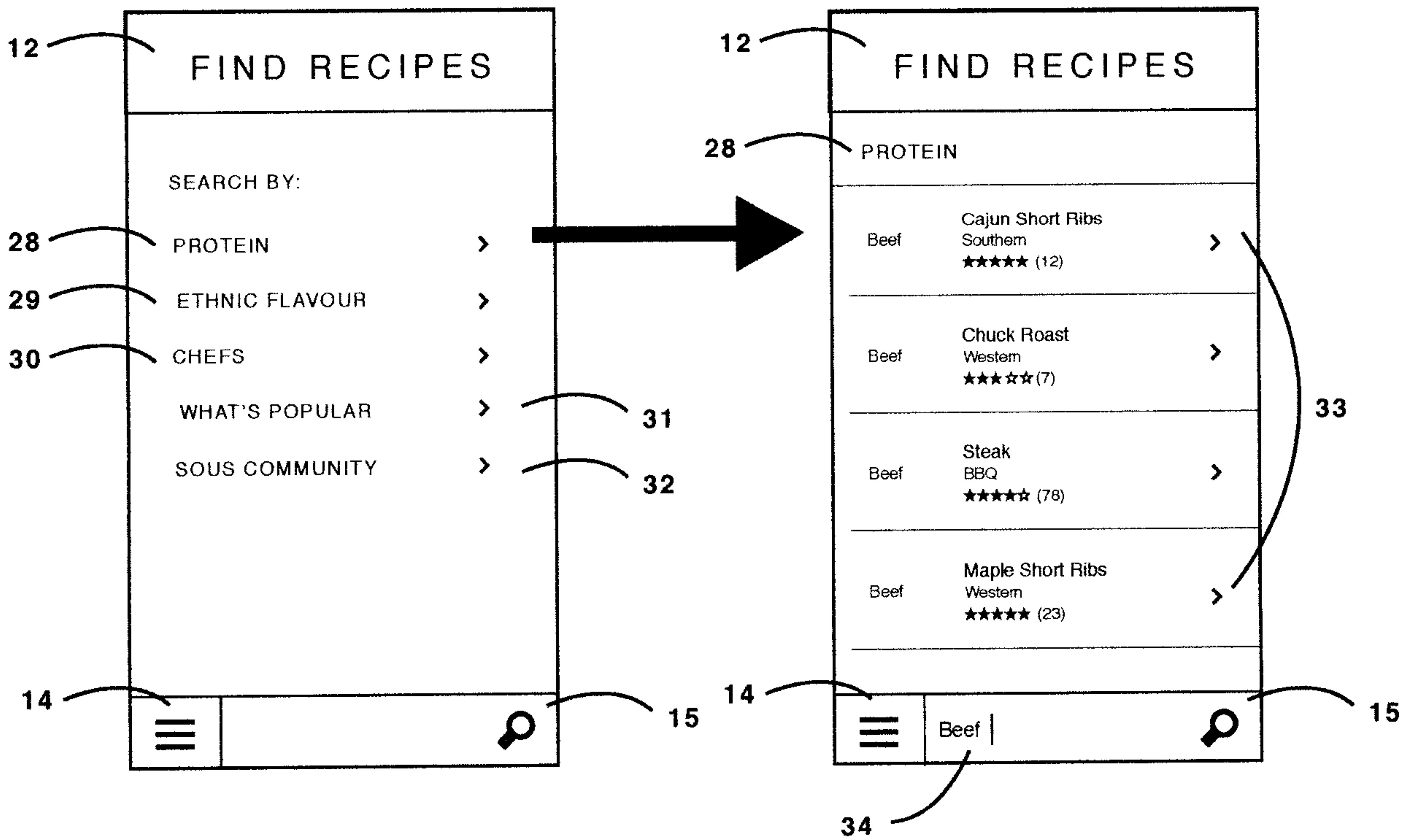


Figure 3c.

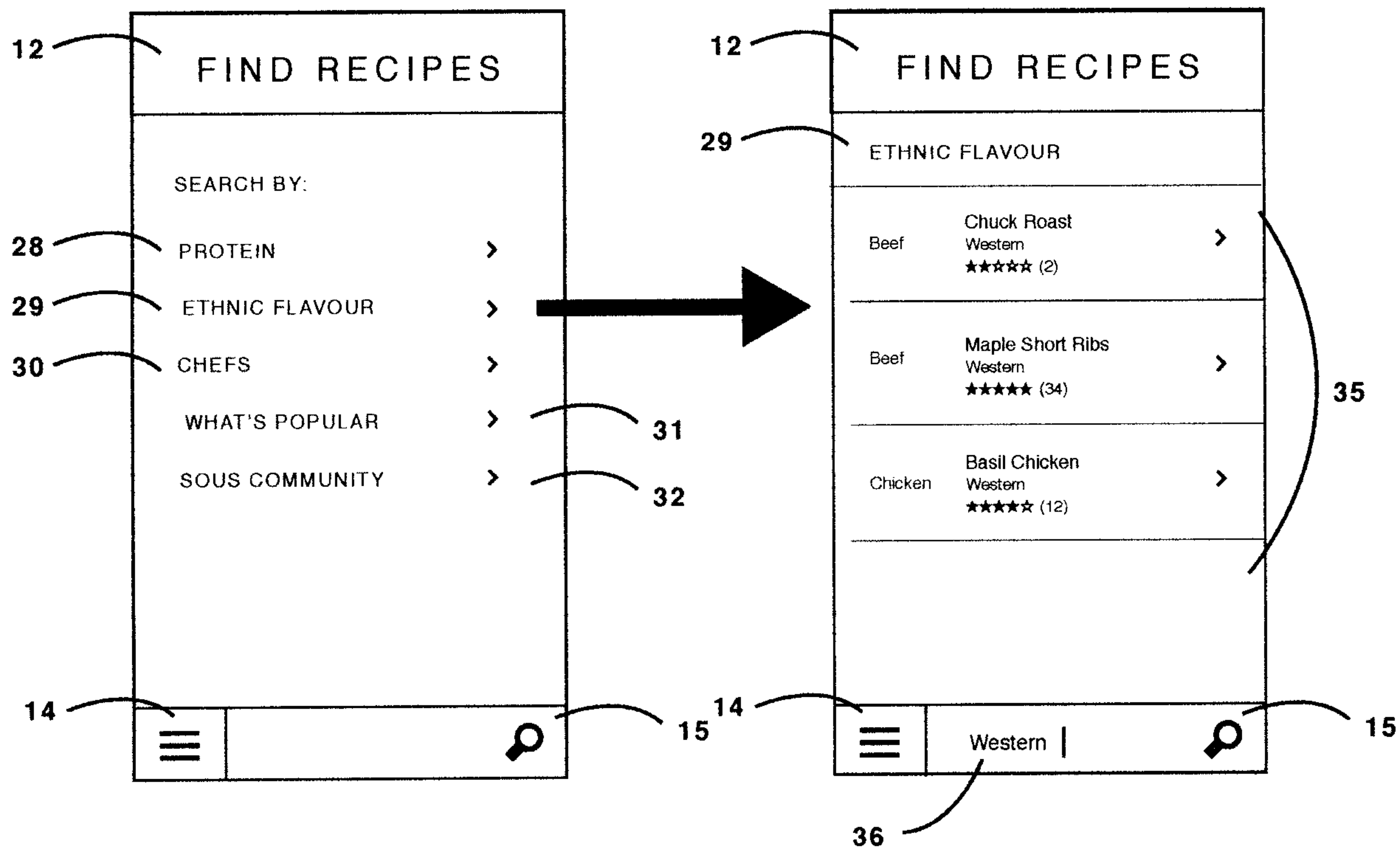


Figure 3d.

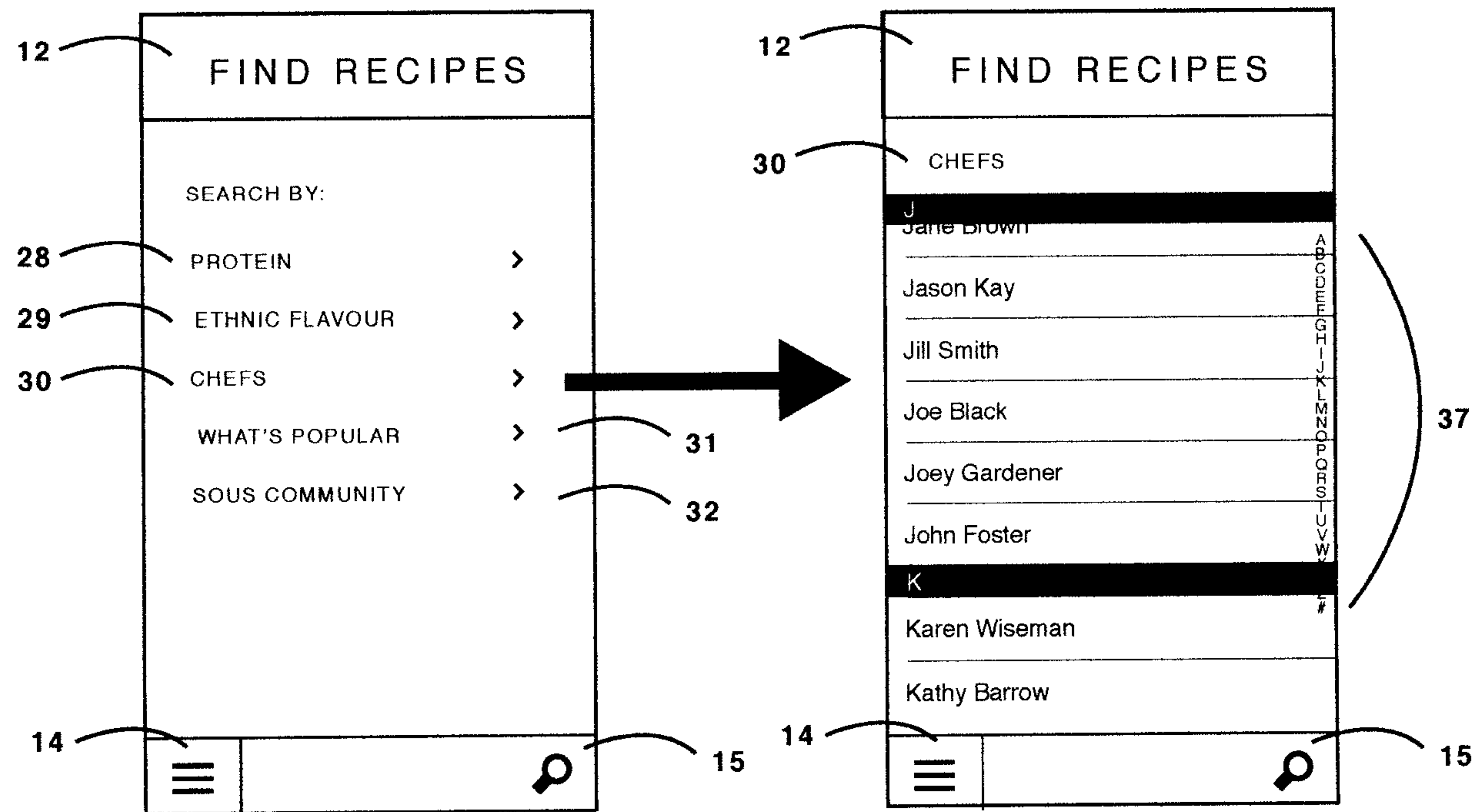


Figure 3e.

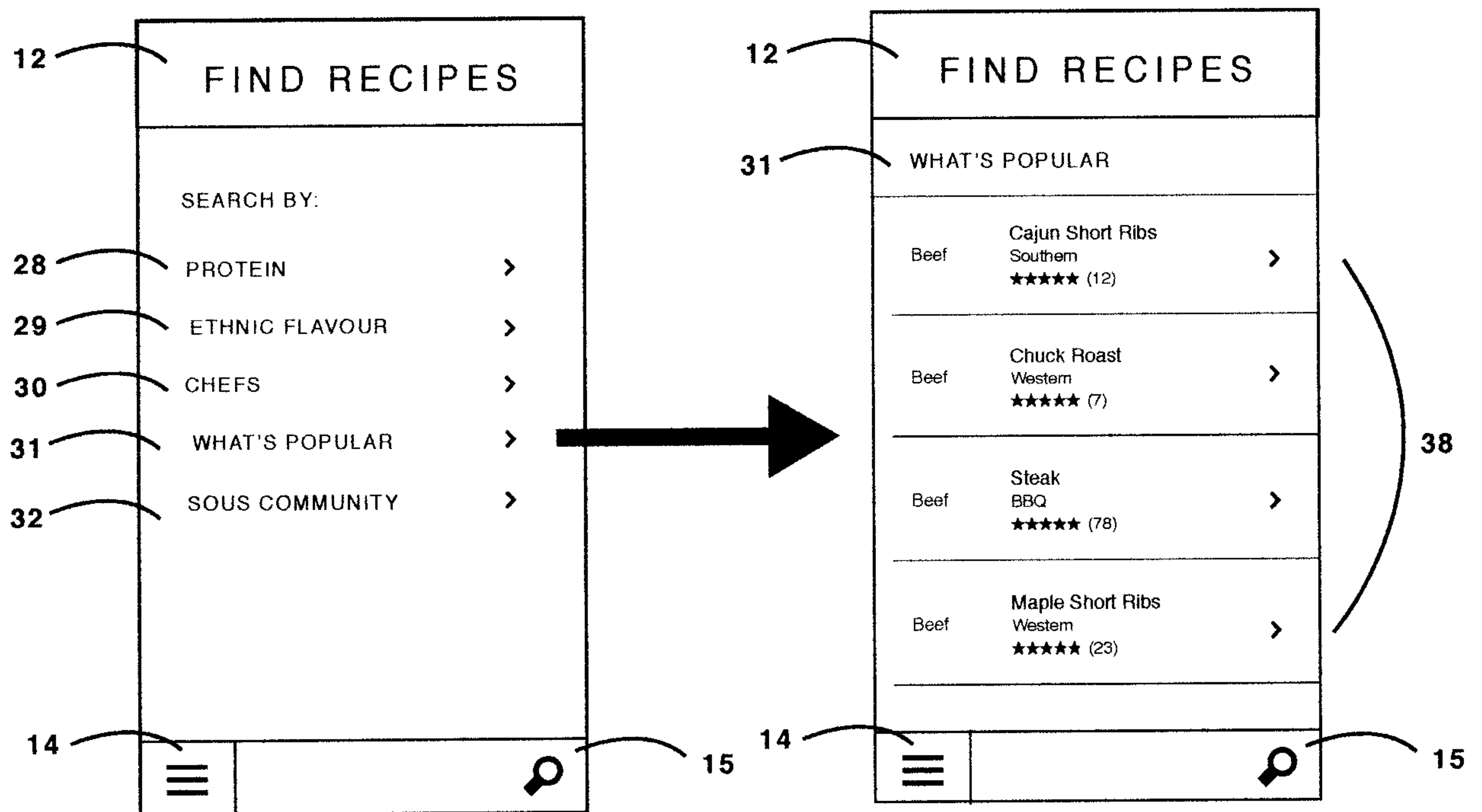


Figure 3f.

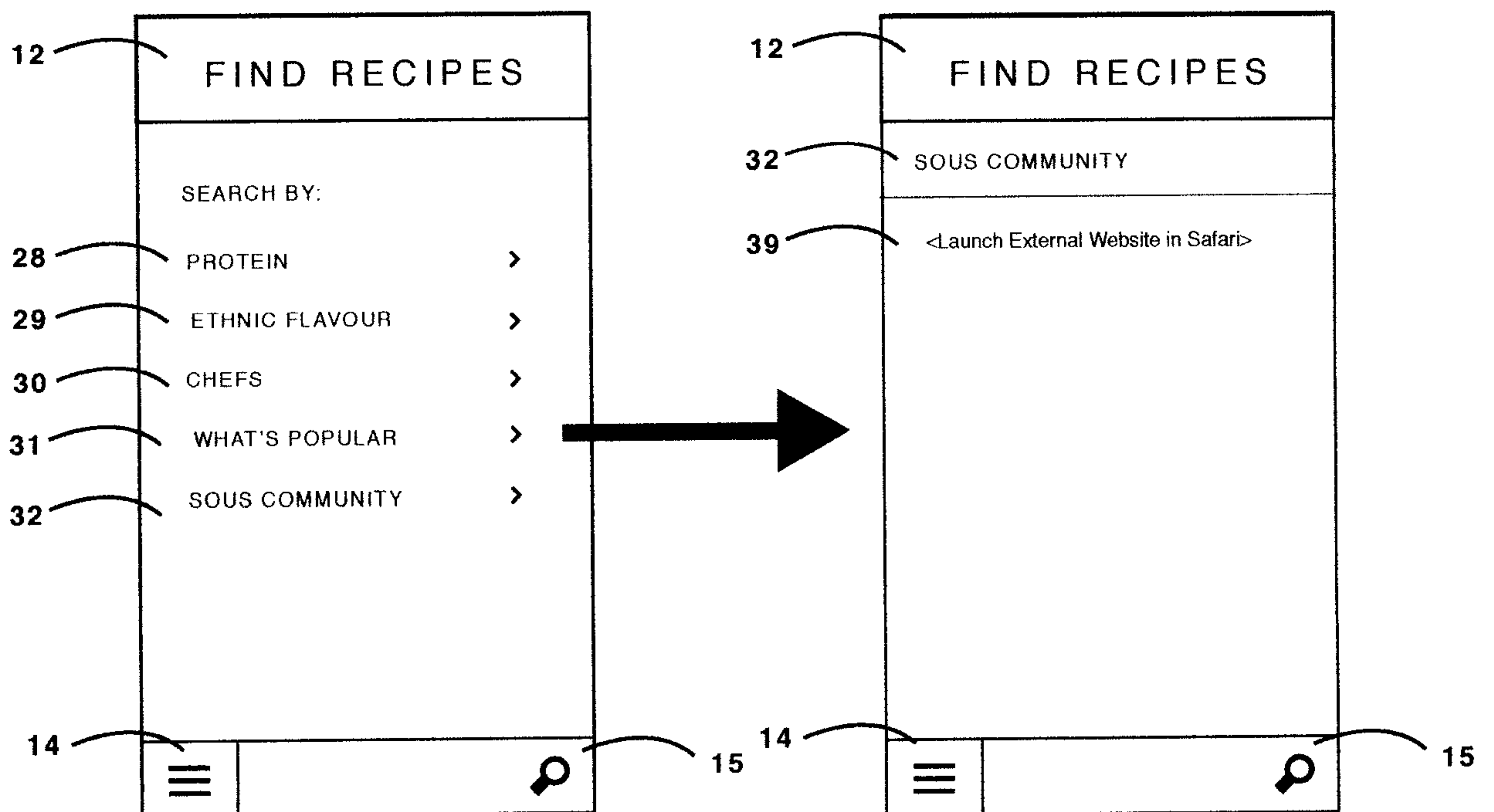


Figure 4a.

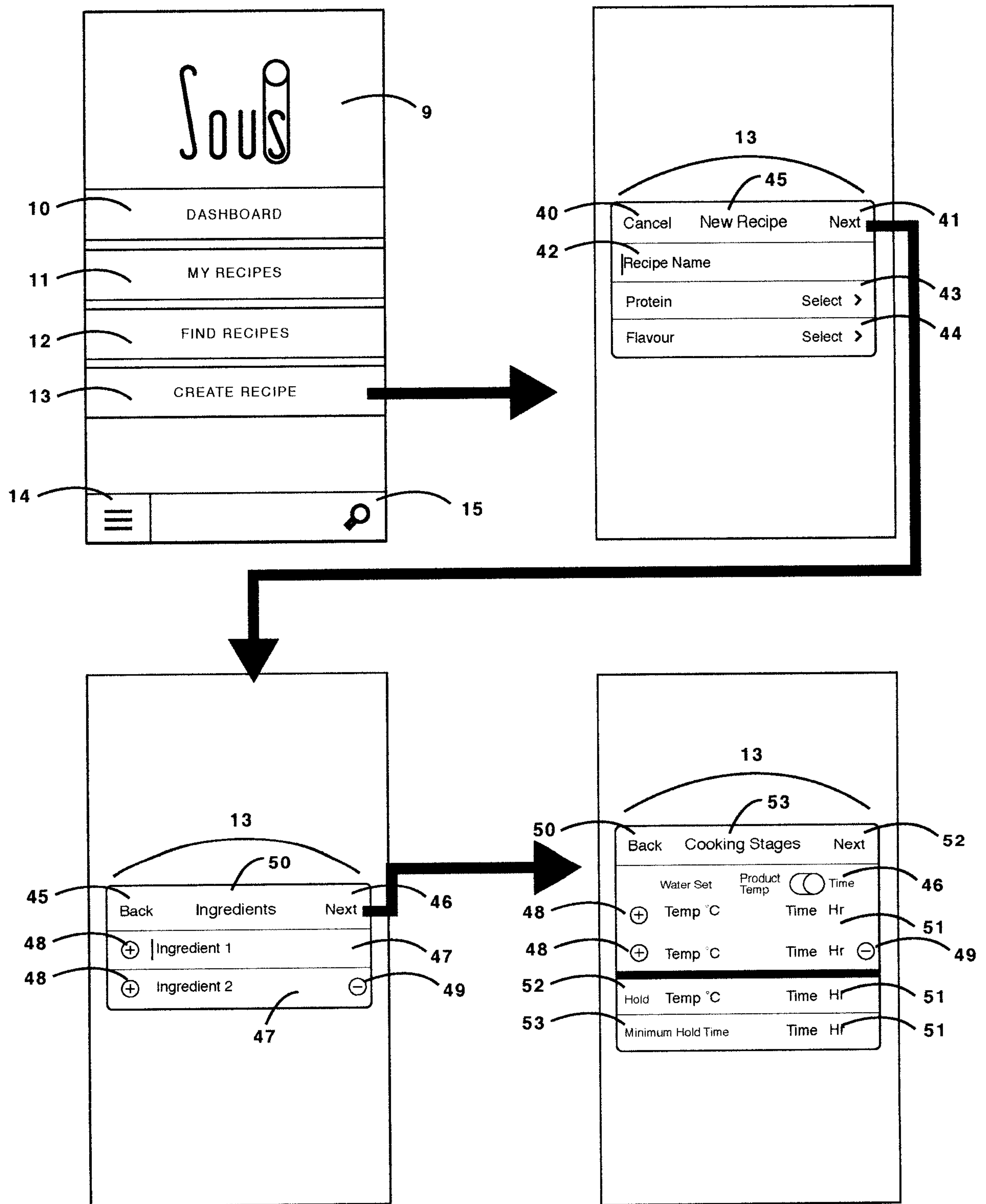


Figure 4b.

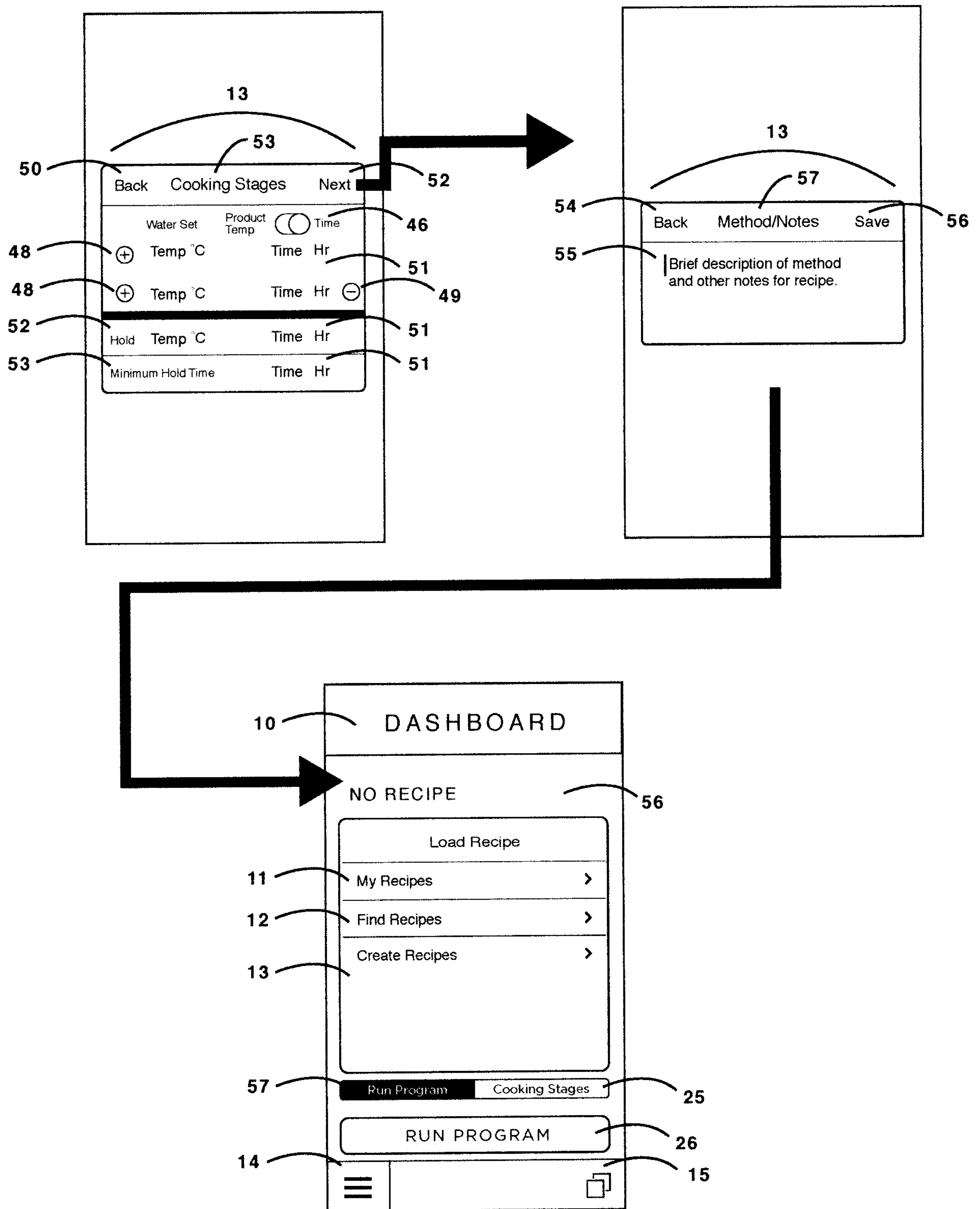


Figure 5a.

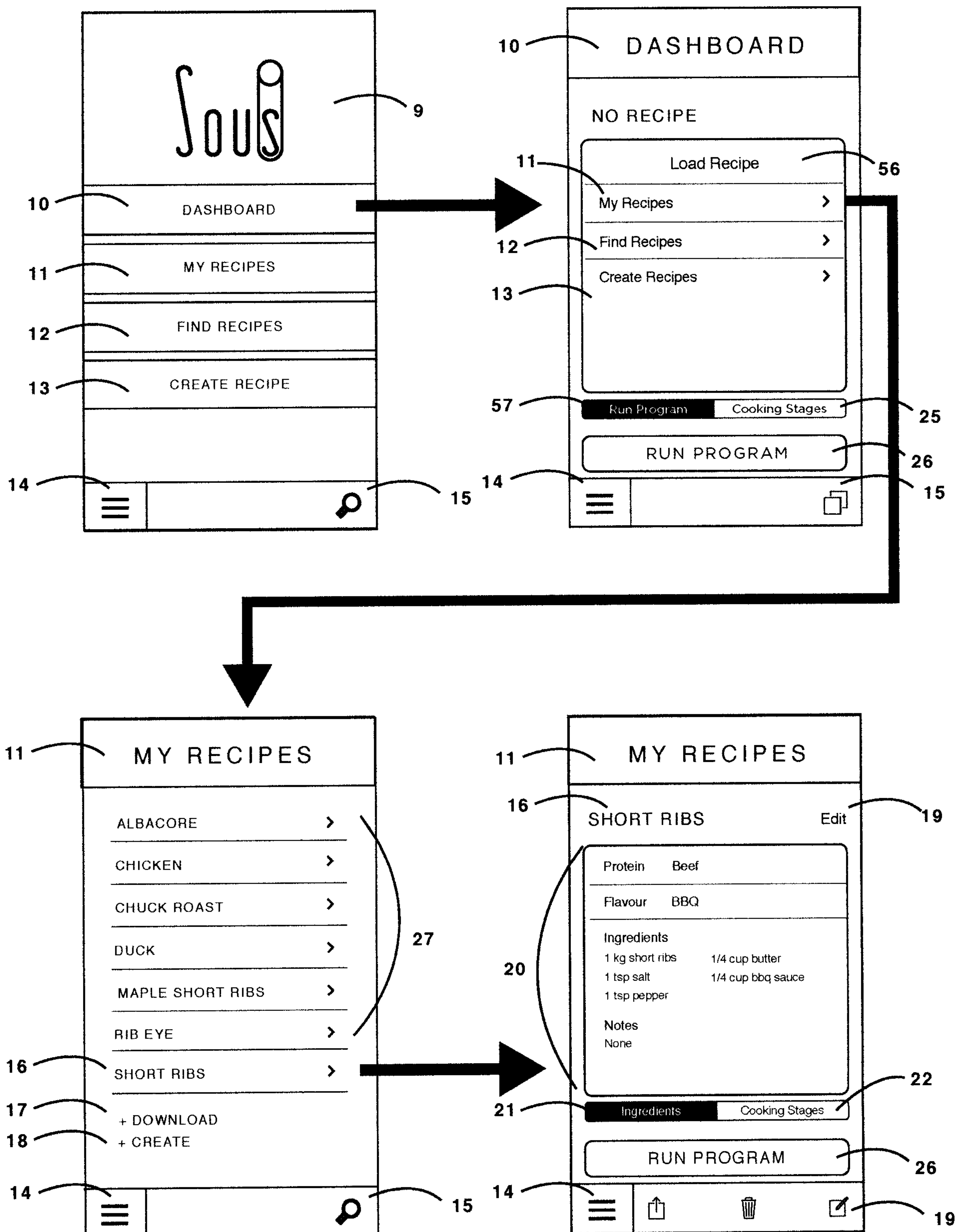


Figure 5b.

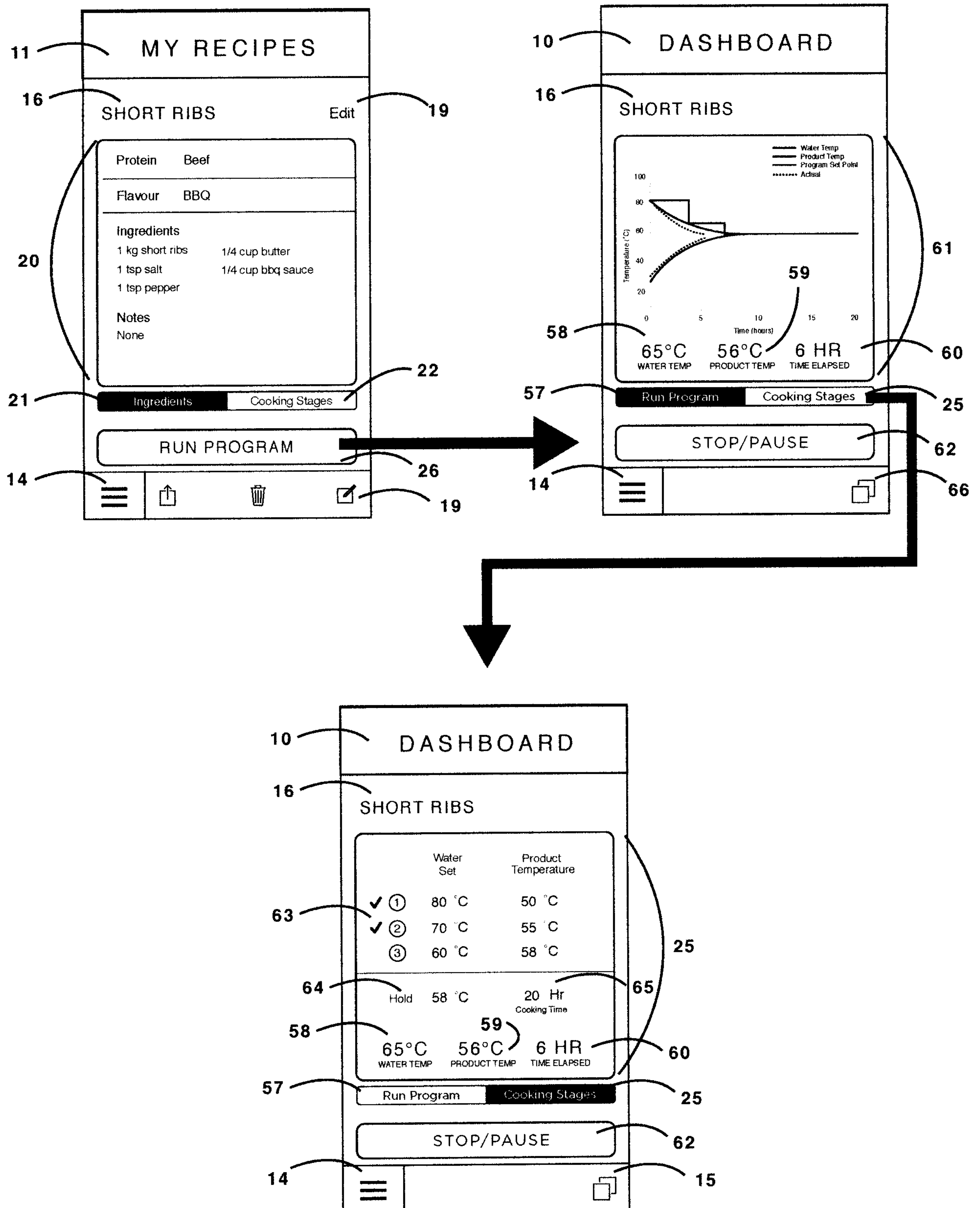


Figure 5c.

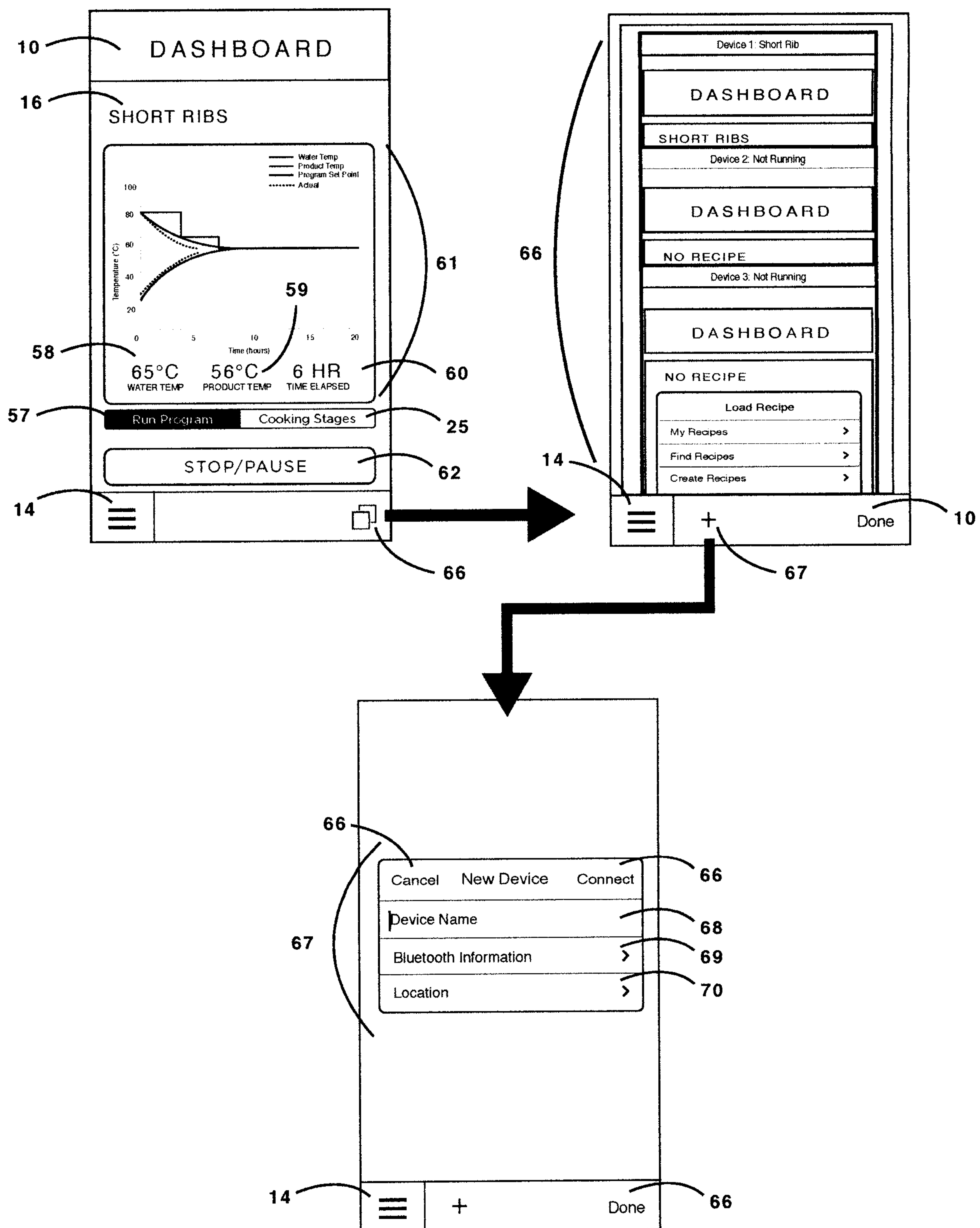


Figure 6

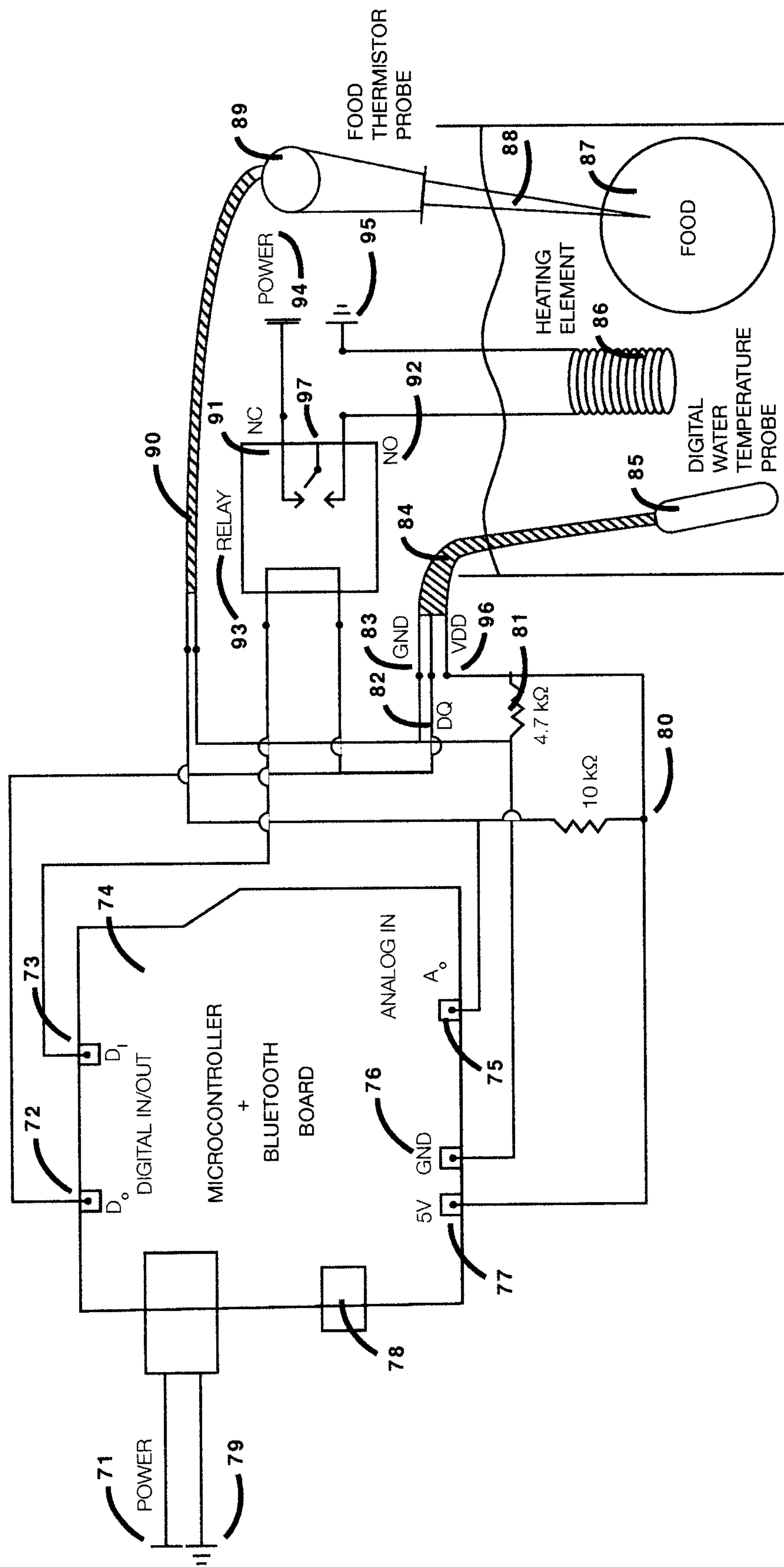


Figure 7

