that engages the reciprocating piston such that, upon receiving a dispense request, the gears move the actuating carriage to reciprocate the piston and cause the dispensing of fluid. An example of this general concept is shown, by way of example only, in U.S. Published Pat. Applic. No. 2006/0124662, incorporated herein by reference. With a peristaltic pump as pump **124**, the actuating mechanism **130** could include roller elements and appropriate drive mechanism therefore that contact the peristaltic pump tube to roll there against and cause the dispensing of a discrete dose of product. With a dome pump as pump **124**, the actuating mechanism **130** could include gears that actuate a plunger to push the dome. An example of this general concept is shown, by way of example only, in U.S. Pat. No. 6,390,329, incorporated herein by reference. An eccentrically mounted plunger could also be employed to actuate any one of the forgoing types of pumps.

The actuating mechanism **130** is controlled by the dispenser controller **140**, which can also be provided in the housing **112**. Controller **140** includes appropriate hardware, software and memory to control the operation of the actuating mechanism **130** in accordance with the teaching herein. Particularly, the controller **140** is programmed to receive a dispense request, as generally represented at box **150** of the schematic of FIG. **3**, and, upon such a request, acts upon the actuating mechanism **130** to cause it to actuate the pump a sufficient number of times to achieve the desired dose. The controller **140** preferably controls the actuating mechanism **130** such that the successive actuations of the pump **124** occur sufficiently quickly so that an end user will not withdraw their hand before all successive doses of product are dispensed. In some embodiments, all successive actuations occur within 1.5 second. In other embodiments, all successive actuations occur within 1 second. In other embodiments, all such successive actuations occur within less than 1 second. It is desired that each successive discrete dose follows the previous discrete dose such that the desired dose actually dispensed appears to be dispensed as one discrete volume. In some embodiments, each discrete dose is dispensed within 0.2 seconds of the previous discrete dose. In other embodiments, each discrete dose is dispensed within 0.1 seconds of the previous discrete dose.

The dispense request represented at **150** is simply the act of an individual appropriately interacting with the dispenser **110** to cause the dispenser to dispense product. In a particular embodiment, the dispense request **150** can be made by an individual activating a touchless sensor **128** that is positioned to sense the presence of a hand under the outlet **126**. In another embodiment, the dispense request **150** can be made by an individual touching a particular dispense button **154***a*, **154***b* or **154***c*, as will be described more particularly below. It will be appreciated that the components (hardware, software) necessary for receiving a dispense request are part of the dispenser controller **140**.

The benefits realized from this dispenser **110** are many. First, the dispenser **110** can be made to dispense virtually any desired dose of product without having to create different pumps for different applications. For example, where it was previously necessary to design a pump with a discrete dose of 1 ml for applications where a 1 ml dose is desired (the desired dose), and to design a pump with a discrete dose of 2 ml for applications where a 2 ml dose is desired, the dispenser **110** of this invention can be selectively programmed to dispense 1 ml or 2 ml or, indeed, any dose volume that is an increment of the discrete dose provided by one actuation of the pump **124**. If the pump **124** is designed to dispense a discrete dose of 0.1 ml, programming the controller **140** to actuate the pump 10 times upon receiving a dispense request will yield a 1 ml desired dose, and programming the controller **140** to actuate the pump 20 times upon receiving a dispense request will yield a 2 ml desired dose. Thus, the dispenser manufacturers can make a single dispenser with a single pump, and simply change the programming for a given end user and that end user's desire dose for different types of products, different end uses, or different types of dispensers.

Second, the dispenser **110** can be programmed in a number of ways. The controller **140** can be preprogrammed by the manufacturer to yield a particular desired dose upon a dispense request. Alternatively, the controller **140** could include buttons or dials or other means generally indicated at **142** for programming the controller **140** to control the actuating mechanism **130** appropriately to achieve a desired dose. These buttons or dials **142** could be made accessible at the interior of the housing **112**, to be accessed and employed by maintenance staff, or could be made accessible at the exterior of the dispenser housing, to be employed by each user, as desired. As yet another alternative, the controller **140** could be preprogrammed to control the actuator mechanism **130** in accordance with a volume selection made by the end user or service personnel. Particularly, the controller **140** could be programmed to receive a dispense request from the previously mentioned dispenser buttons **154***a*, **154***b*, **154***c*, with each button bearing indicia correlating to a different desired dose of product. By presenting these dispenser buttons **154***a*, **154***b*, **154***c* at the exterior of the dispenser **110**, the end user could select a desired dose simply by pressing a given button, and the controller **140** would be programmed to control the actuating mechanism **130** accordingly to dispense the desired dose selected by the user. In a particular embodiment, the dispenser **110** dispenses soap and includes a 1 ml button, a 2 ml button and a 3 ml button selectable by the user in accordance with a desired dose the user wishes to receive. Those with heavily soiled or larger sized hands may opt for the larger dose (as might those individuals needing extreme cleanliness and sanitation, for instance in the use of a surgical scrub), while those with less soiled or smaller sized hands may opt for the smaller doses.

As yet another alternative for programming the dispenser **110**, the controller **140** of the dispenser **110** could be preprogrammed to control the operation of the actuating mechanism **130** in accordance with a signal received from a refill unit **120**. The controller would include a signal-receiving device **144** and be programmed to receive a signal from a signal-emitting device **160** carried by the refill unit **120**. The controller **140** would be preprogrammed to recognize various signals, with each signal being associated with a particular desired dose. This will be particularly useful where the type of product being loaded into the dispenser via the refill unit **120** might change. By employing this programming concept, the amount of product dispensed will be a direct result of the signal generated by the signal-emitting device **160** and the programming of the controller **140**. For example, if a mechanic's soap refill unit is inserted into the dispenser housing, the signal might cause the controller **140** to control the actuating mechanism so that a relatively large 2 ml dose of the mechanic's soap product is dispensed upon receiving a dispense request, while, if a sanitizer refill unit is inserted into the dispenser housing, the signal might cause the controller **140** to control the actuating mechanism so that a smaller 1.0 ml dose of the sanitizer product is dispensed.

It will be appreciated that dispensers of this type can be powered by a mains power supply (e.g., alternating current) or by battery or, indeed, by any suitable power (e.g. solar). The power supply, which in this embodiment is provided by batteries **162** preferably provides all necessary power to oper-