disclosure. In addition to the system control unit **31**, the judging unit **322**, the determining unit **34**, and the executing unit **35**, the mobile terminal shown in FIG. **4** may also comprise a monitoring unit **41** configured to monitor and acquire and/or receive the signaling identifier, which may be released in system startup controlled by the system control unit **31** and corresponds to startup in real time.

Once the mobile terminal completes the startup, the processor may issue and/or release a signaling identifier in real-time, e.g., boot.complete for Android™ system, to inform all applications of the mobile terminal that the system has completed the startup and now is under the wake-up state. As a result, the processor may monitor and acquire and/or receive the signaling identifier in real time and may use the signaling identifier for determining and/or judging whether the current mode and/or state of the mobile terminal is under operation mode (i.e., the mobile terminal has been awaken completely).

The judging unit **322** may be configured to judge a second time difference between the time corresponding to the received signaling identifier (i.e., startup-completion time) and the pre-determined target alarm clock activation time. The judging unit **322** may also be configured to compare a second reference time period with the time difference. When the processor determines that the second time difference is less than the second reference time period, the determining unit **34** may further be configured to determine that the startup completion time is the actual alarm clock activation time.

The executing unit **35** may be configured to start the alarm clock to execute the ringing operation according to the determined actual alarm clock activation time.

FIG. **5** illustrates a function diagram of a mobile terminal according to a third example embodiment of the present disclosure. In addition to the determining unit **34** and the executing unit **35**, the mobile terminal shown in FIG. **5** may also comprise a storage unit **51**, configured to store a tag of the state identifier corresponding to each set time saved in a queue (e.g., the list of time for events in Table I); a searching unit **52**, configured to search a corresponding state identifier within the second reference time period from the startup-completion time. Further, the mobile terminal may comprise the judging unit **522**, configured to judge the corresponding state identifier within the second reference time period from the startup-completion time.

If the state identifier is alarm clock startup identifier (i.e., the identifier is corresponding with an alarm clock activation event and the value is "1"), the determining unit **34** may be further configured to determine the current time is the actual alarm clock activation time, and the executing unit **35** may execute the alarm clock ringing operation.

Further, the storage unit **51** may be configured to store a ring tone for the alarm clock. The ring tone that is selected as alarm clock ring may be copied into a storage unit of the system from an SD card. The SD card may not be activated when the system is awakened to execute the ringing operation of the alarm clock. Thus if the ring tone is saved on the SD card, there will be only blare or beep prompt tones self-provided in the system rather than the selected ring tone when mobile terminal is awakened to execute the alarm clock activation operation. After the target alarm clock activation time is set and/or determined, the ring tone is recorded and saved in the storage unit of the mobile terminal.

FIG. **6** illustrates a function diagram of a mobile terminal according to a fourth example embodiment of the present disclosure. The mobile terminal may comprise a processing module **61**, an executing module **62**, and the acquiring module **312**. The processing module **61** may be configured to process an operating instruction for the ringing operation. The acquiring module **312** may be configured to acquire and/or receive the operating instruction for processing. The executing **62** may be configured to execute to continue or terminate the alarm clock activation operation according to the operating instruction for processing.

As described above, methods and devices according to example embodiments of the present disclosure may comprise an awakening module configured to awaken a system of a mobile terminal to start under a shutdown state. The methods and devices may also comprise a monitoring unit configured to monitor a startup state and the shutdown state of the system in real time. The monitoring unit may be able to monitor the current time in real time. When the monitoring unit detects and/or determine that the current time reaches at the set alarm clock time, an instruction may be sent out to the awakening unit to awaken up operation systems of the devices. Whether the time that the operation system completes the startup, i.e., the startup-completion time, is the actual alarm clock activation time may be judged and/or determined according to the determination of the determining unit; and the ringing operation may be executed when the startup-completion time is determined to be the actual alarm clock activation time. Thus the function of implementing alarm clock ringing under the shutdown state may be improved, the user experience may be improved, the service life of a battery may be saved, and the consumption of the mobile phone may be reduced.

In addition, a person of ordinary skill in the art may understand that the drawings are only schematic diagrams of preferred example embodiments; and modules or flows in the drawings may or may not be required by implementing the present disclosure. The person of ordinary skill in the art may understand that the modules in the device of the example embodiments may be changed and rearranged in one or a plurality of devices. The modules of the example embodiments may be combined into one module or may further be divided into a plurality of sub-modules. The serial numbers of the example embodiments of the present disclosure are for descriptions only, but not intended to represent the advantages and disadvantages of the example embodiments. It should be clear that a person of ordinary skill in the art may make any alternation and deformation on the present disclosure within the spirit and scope of the present disclosure. Thus, if these modifications and deformations of the present disclosure belong to the scopes of the claims of the present disclosure and equivalent arts, the present disclosure intends to include these modifications and deformations.

What is claimed is:

1. A mobile terminal, comprising:

at least one non-transitory storage medium comprising an application for operating an alarm clock function when the mobile terminal is off;

at least one executing unit in communication with the at least one non-transitory storage medium that is configured to execute the application and is configured to:

receive a target alarm clock activation time;

determine a first time difference between a current time and the target alarm clock activation time;

compare the first time difference with a first reference time period;

when the time difference is less than the first reference time period, execute a startup operation;

receive a startup-completion time when the startup operation is completed;

determine the startup-completion time to be an actual alarm clock activation time; and