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CEMENT TESTING DEVICE

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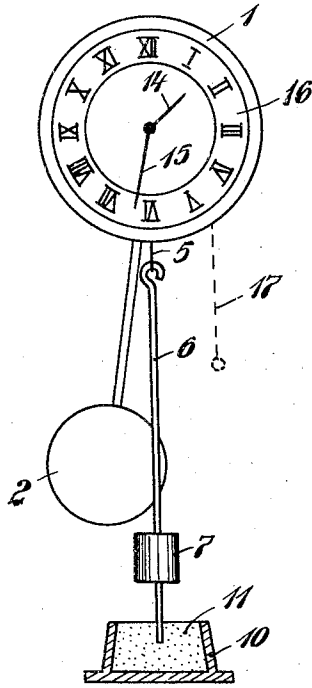


Fig. 1

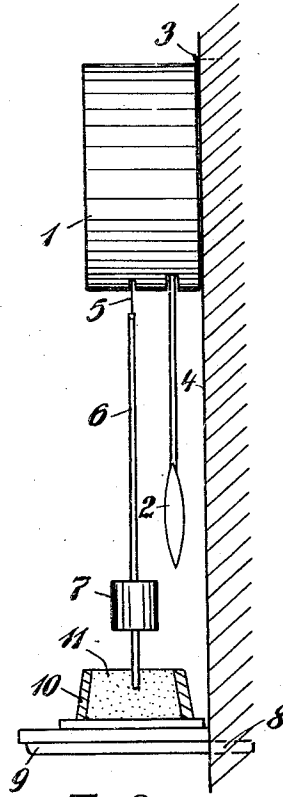


Fig. 2

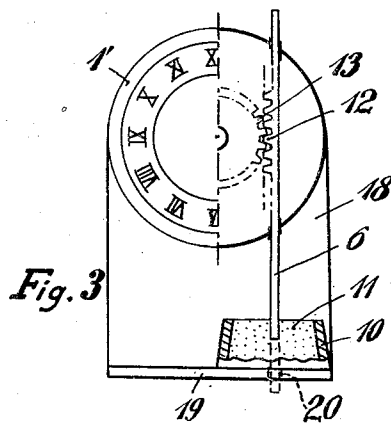


Fig. 3

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UNITED STATES PATENT OFFICE

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CEMENT TESTING DEVICE

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6 Claims. (Cl. 265-11)

The invention relates to a device for automatically indicating or ascertaining the period of time which is required for the "setting" of any substances which starting from a liquid or plastic state become gradually hard and solid. This so-called "setting" time and more particularly the time which is required until the setting begins is an important feature of various building and similar materials such as mortar, plaster and more particularly of cement or mixtures of any of these materials with sand and the like in the form of concrete. When in the following description of my invention the term "cement" is used, it is understood that it is used as an example for any kind of material which is capable of "setting", hardening or binding.

It is the object of my invention to provide an apparatus which is very robust and simple in its construction and operation, so as to be useful not only for laboratory tests but to be adapted especially for use on the building site and to indicate or record the beginning of the setting in an automatic manner.

My new device consists of a clock-work or watch which is connected with a feeling member in the form of a rod, pin or bar extending with its free end into the cement or other substance to be tested. The rod is gradually moved forward by the clock-work so as to penetrate into the cement very slowly, while the clock-work is stopped as soon as the rod cannot further sink into the cement, i. e. as soon as the cement begins to set and hence offers an increasing mechanical resistance to the entering rod.

For a complete understanding of my invention, the following description should be read in connection with the accompanying schematic drawing, in which:

Fig. 1 is a front view of a preferred form of the device;

Fig. 2 is a side elevation of the device shown in Fig. 1;

Fig. 3 is a front view of another form of my new device.

Referring to Figs. 1 and 2, a clock-work 1 of any suitable known form and construction and having a pendulum 2 is secured to the wall 4 as at 3. The driving force for the operation of the clock 1 is imparted to it by means of a weight suspended at a little chain or the like 5 in conventional manner. However, instead of the ordinary weight of the clock a rod 6 is provided which in addition may carry one or more weights 7. Underneath the rod 6 is an open container 10 resting on the bracket 9 which is secured to the

wall 4 as at 8, the container being filled with the substance to be tested such as a mixture of cement and water in form of a pulp or paste, as indicated at 11.

The operation of the device is as follows:

The container 10 with the cement pulp 11 is placed underneath the rod 6 and the clock 1 is set going by starting the pendulum 2. The rod 6 will then gradually sink into the cement pulp 11 and no substantial resistance will be offered by the cement as long as it is not solidified so that the normal operation of the clock is not impaired during a certain period of time. However, as soon as the cement starts its setting action, a considerable mechanical resistance will be opposed to the rod 6 in its further sinking and the clock-work will be stopped as it is no more under the action of the weight of the rod 6 and the additional weight or weights 7. Provided that the clock 1 had been set going at the point of time when the water had been added to the cement, the interval between start and stop of the clock-work corresponds to the period required for the cement to start the setting action. This period is indicated on the dial 16 of the clock by the position of the hands 14 and 15 which to this end have been advantageously set on a predetermined original position such as 0 (12) to facilitate the reading. By means of a little chain 17 the chain 5 including the rod 6 may be wound up to return into its normal position, in the manner known per se in connection with weight-operated clocks.

The reading or measuring results obtained by the device may be compared with those of any known precision meter by way of parallel tests and a characteristic curve or table may be made up for the device accordingly. Or the driving force required for the clock, the cross-section, shape and weight of the rod 6 may be changed or adjusted, for example by means of an exchangeable head piece, in such manner that the readings of the device correspond to those of the precision instrument. Moreover it is possible to effect such correspondence by changing the force required for bringing the clock-work to standstill or by changing the speed of the clock-work by changing the length of the pendulum.

According to Fig. 3 a clock 1' is provided which is spring-operated in known manner and designed in a special form so as to meet the special purpose for which it is intended. To this end, a pinion 13 may be provided which for instance may participate in the rotary movement of the shaft which has fast on it the hour-hand 55

or the minute-hand, respectively, according to the speed which is required. The pinion 13 engages the rack 12 which in turn is connected or integral with the rod 6 having the same function as described above with reference to Figs. 1 and 2 and extending into the container 10 with the cement pulp 11. It will be understood that the clock-work 1' is brought to standstill as the cement is going to solidify and the rod 6 cannot penetrate further into it.

The clock 1' may be controlled by a pendulum 2 as in Fig. 1, but preferably it has a balance mechanism and it may be mounted together with the container 10 on a common base plate 18 having a foot plate 19 for placing it on any suitable surface.

It will be evident that the device shown in Fig. 3 may be made very small and compact so as to be easily portable or even to fit into a pocket or bag. It is very robust in its use and operative irrespective of its accurate horizontal position. I may cause the instrument to be in agreement, as to its measuring values, with a precision instrument, in the same manner as described before with regard to the device shown in Figs. 1 and 2, but the balance mechanism and the driving spring will be adjusted in this case rather than the pendulum length.

If the setting process of larger surfaces of cement or concrete is to be tested, the instrument shown in Fig. 3 may be placed upon a suitable support or directly upon the surface to be tested, with its foot plate 19, and the rod 6 may extend through a bore 20 in the foot plate 19 and engage the surface to be tested. The device in this case should be sufficiently heavy in weight or held to the surface to be tested by suitable additional weights or other means. In this manner it is possible to test the setting-time of the substances in situ, if desired.

I claim:—

1. In a device for indicating the period of time required for the setting of solidifying substances, in combination, a clock-work, a feeling member co-acting with the clock-work being adapted to sink gradually into the solidifying substance synchronously with the gradual movement of the clock-work mechanism, and stop the clock-work when the said feeling member is stopped from sinking further due to the setting of the solidifying substance.

2. In a device for determining the period of time required for the setting of solidifying substances, in combination, a clock-work, means for controlling the operation of the clock-work by means of a pendulum, means for winding up

the clock-work, a feeling member adapted for movement in a vertical direction and driving the clock-work by its weight, whereby said feeling member is slowly sunk into the substance to be tested and stops the clock-work, as soon as the substance due to its beginning solidification resists the further sinking of the feeling member.

3. In a device for determining the period of time required for the setting of solidifying substances, in combination, a spring-operated clock-work, a feeling member adapted for movement in a vertical direction and being driven by the spring power of the clock-work, whereby said feeling member is slowly sunk into the substance to be tested and stops the clock-work, as soon as the substance due to its beginning solidification resists the further sinking of the feeling member, a foot plate and a container on the foot plate for receiving the substance to be tested.

4. In a device for determining the period of time required for the setting of substances like cement, in combination, a spring-operated clock-work, a rack- and pinion gear, a feeling member integral with the rack and adapted for movement in a vertical direction and being driven by the spring power of the clock-work through said pinion, whereby said feeling member is slowly sunk into the substance to be tested and stops the clock-work, as soon as the substance due to its beginning solidification resists the further sinking of the feeling member.

5. In a device for determining the period of time required for the setting of solidifying substances, a foot plate adapted to rest on the said substance having an aperture therein, a feeler movable through said aperture, and registering means mounted on the foot plate for registering the period of movement prior to the solidification of the substance into which the feeler is projected.

6. In a device for determining the period of time required for the setting of solidifying substances, in combination, a spring operated clock-work, a rack and pinion gear operated thereby, a feeling member supported by and moved with the rack whereby the feeling member is slowly sunk into the substance to be tested and stops the clockwork when the substance has gained a certain degree of solidification, and an apertured foot plate supporting the clock and adapted to rest on the substance being tested through which the feeling member is movable for penetrating substances thereunder.

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