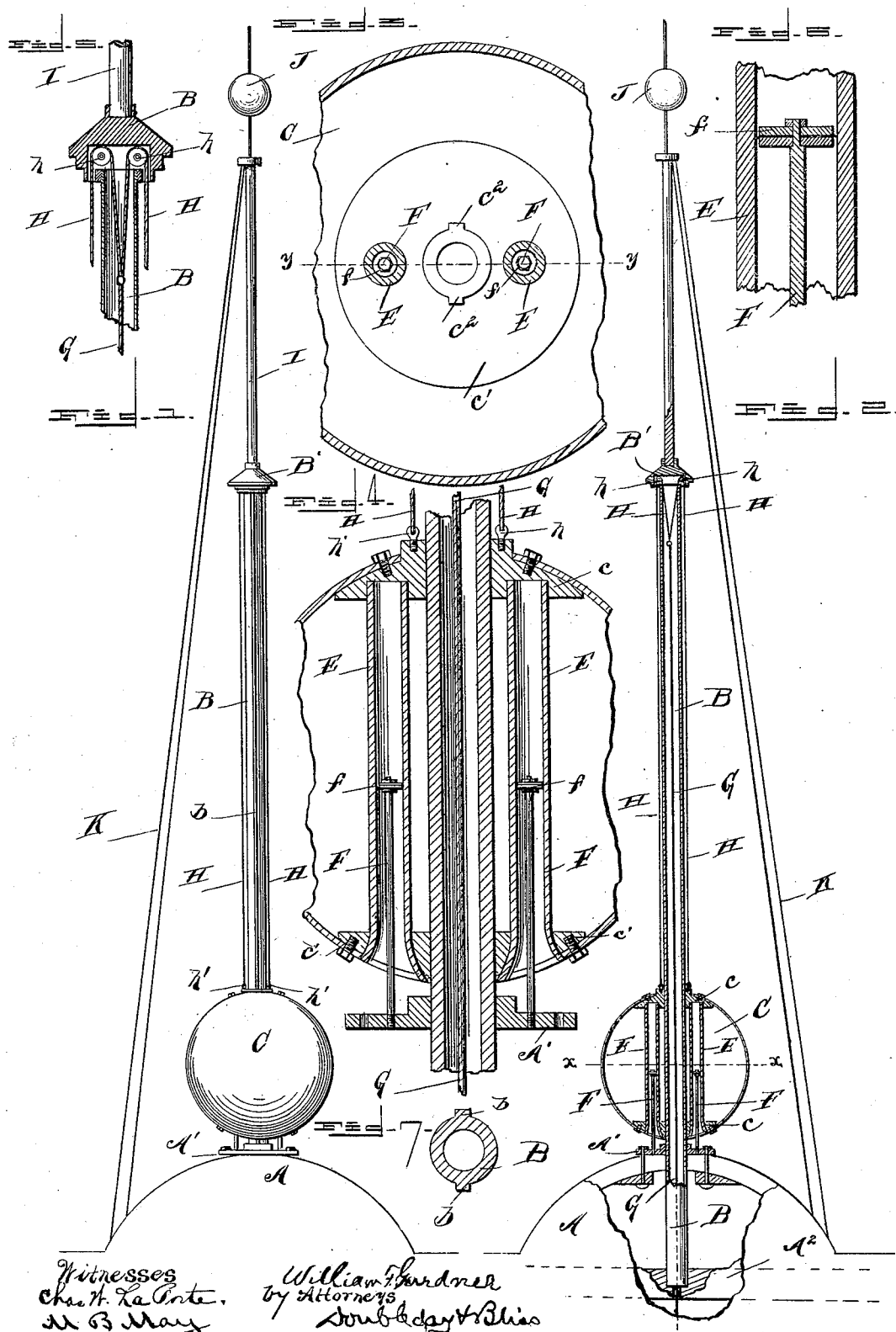


(No Model.)

W. F. GARDNER.
TIME BALL.

No. 520,879.

Patented June 5, 1894.



Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM F. GARDNER, OF WASHINGTON, DISTRICT OF COLUMBIA.

TIME-BALL.

SPECIFICATION forming part of Letters Patent No. 520,879, dated June 5, 1894.

Application filed July 6, 1893. Serial No. 479,727. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. GARDNER, a citizen of the United States, residing at Washington, in the District of Columbia, have
5 invented certain new and useful Improvements in Time-Balls, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in
10 time balls and their connected parts, that is to say the balls which are automatically dropped from elevated points for the purpose of indicating the arrival of a predetermined instant of time.

15 Heretofore I have constructed numerous balls for this purpose, each of which had combined with it means for elevating it, means for supporting and guiding it, electro-magnetically actuated devices for detaching it
20 from its support and permitting it to drop, and a cushioning mechanism comprising a large cylinder exterior to the ball and surrounding its vertical axis of a diameter somewhat greater than that of the ball, and of a
25 depth somewhat greater than the radius of the ball. Under some circumstances it is found that a cushioning mechanism of the sort referred to is objectionable for several reasons including the following: First, the
30 weight of the apparatus is largely increased by the presence of this large cushioning cylinder; secondly, the mechanism is thereby made too bulky to be adapted to fit upon the top of any numerous places where it is desirable to erect these balls, such as cupolas, turrets, ridges, &c. Again the large cylinders detract from the tasty and ornamental appearance which it is generally aimed to give to those parts of buildings upon which the balls
35 are mounted.

The object of the present invention is to provide a time ball with supporting, operating, and cushioning mechanism which will overcome these difficulties.

45 Figure 1 is a side elevation of a time ball and its adjuncts embodying my improvements. Fig. 2 is a vertical section. Fig. 3 is a cross section on the line *x, x*, Fig. 2. Fig. 4 is a vertical section of the ball and the staff
50 on a larger scale. Fig. 5 is a vertical section of the cap piece at the top of the staff on a larger scale. Fig. 6 is a section of one of the

cushion cylinders and its piston. Fig. 7 is a cross section of the staff.

In the drawings A indicates generally a
55 dome or a portion of a roof, or of a frame, the upper part of a building. Upon this the ball and its connected parts are supported.

B indicates a staff mounted vertically in relation to the aforesaid part A of the building,
60 it passing through the top thereof and being supported on and secured to a beam as at A².

A' is a plate preferably of metal rigidly secured to the part A, above it, and forming a bracing and holding device to steady the staff
65 B. This part B is preferably tubular, and can be formed of galvanized iron pipe, or other suitable material. It extends upward to a distance equal to that over which it is desired that the ball shall drop, and at the upper end
70 is provided with a cap at B' adapted to close it and protect the interior from the entrance of snow or rain. It is formed or provided with guides *b* adapted to hold the ball in such way that it cannot twist or rotate around the
75 staff.

The ball is indicated as a whole by C. It may be made of suitable material and of any desired dimensions. At *c, c'*, there are guides,
80 one being at the top, and the other at the bottom of the ball. Each has a central aperture through which passes the staff B, and from the aperture there extend grooves or slots *c*², to which are fitted the aforesaid guides *b* on
85 the shaft.

E, E, indicate vertically arranged cylinders or tubes they being fastened at their upper ends in the guides *c* and at their lower ends in that at *c'*.

F, F, indicate rods or bars secured to the
90 base plate A' and rising vertically therefrom, each being situated on the axis of one of the aforesaid cylinders or tubes E. Each rod or arm is provided with a piston *f* fitting the interior bore of the cylinder E. The guides
95 and other parts should be so adjusted as that when the ball descends the cylinders E will pass over the pistons *f*. To insure the proper entrance of the pistons into the cylinders, the latter may be flared or expanded somewhat
100 at their lower ends to compensate for any variation from the desired downward path of the ball.

G indicates a cord, rope or chain, which

passes up through the tubular staff B to a point near the upper end, and it is there connected to two cords or chains H, H, which pass over pulleys *h, h*, beneath the cap B', and thence down along the outer sides of the staff to the attaching devices at *h'* where they are connected to the ball.

The cord G passes down into the building to the room or place selected for the detaching apparatus. It is connected to and released by that apparatus in the well known way, and therefore no detailed description thereof is herein necessary.

The manner of operating the device as above described will be readily understood. A few minutes before the arrival of the predetermined instant the rope or cord G is drawn downward by a windlass forming part of the elevating and detaching apparatus, this drawing down of the rope resulting in the elevating of the ball to the top of the staff. Upon the arrival of the predetermined instant the cord G is released and immediately the ball descends until the cylinders E commence to pass over the pistons *f*. As soon as the latter occurs the air within the cylinders commences to be compressed and the dropping of the ball is retarded and it is brought gradually to a state of rest before it can strike the roof or base plate or other parts at the bottom.

A ball of this character can be made much more ornamental than can the mechanism heretofore used, and by employing an air cushioning mechanism inside of the ball the weight of the whole apparatus can be greatly reduced.

To enable the mechanism to be rendered still more ornamental I combine with the ball staff B a flag staff I, surmounted by an ornamental ball J, the staff I being stepped in a socket provided for it in the cap or cover B', the rope or cord for the flag being indicated by K.

By having two air cushioning cylinders and pistons arranged on different sides of the vertical axis of the ball I secure an approximately perfect balancing thereof both in relation to the guides and to the action of gravity.

Preferably guides are combined with the cushioning cylinders and pistons, to insure that the latter shall properly enter the cylinders. Such guides can be provided by flaring or expanding the lower ends of the cylinders, in the way shown.

The above described guides *c, c'*, which hold the ball properly on the staff, are of the form of plates, adapted not only to serve as such guides for the ball, but also to serve as supports for the ends of the cylinders, the latter passing through the lower plate, and having their upper ends secured to the upper plate. Moreover, they receive and support

the exterior parts of the ball. The latter can be made of any now well known material used for this purpose, such as canvas, or the like. It is practically continuous on lines around the vertical axis, so that it presents a large surface to the resistance of the air, and it, itself, acts to prevent too sudden a drop, in conjunction with the interior cylinders and pistons.

What I claim is—

1. The combination with a rising and falling time ball of an air cushioning mechanism arranged within the ball consisting of a cylinder and a piston fitted therein, substantially as set forth.

2. The combination of the staff, the ball, the base the cylinder and piston, one secured to the ball, and one to the base, and means for guiding the ball vertically on predetermined lines, substantially as set forth.

3. The combination of the ball, a vertical guide therefor, the cylinder situated within the ball, and the piston and piston support held independently of the ball at the lower end of its path, substantially as set forth.

4. The combination of the ball, a vertical guide therefor, the two cylinders within the ball and arranged on different sides of its vertical axis, and two pistons and piston carriers supported independently of the ball, substantially as set forth.

5. The combination with the rising and falling time-ball, of the cylinder and the piston one of which is within the ball, and the guide for directing the piston into the cylinder, substantially as set forth.

6. In a time-ball, the combination with the top and bottom guide plates, of the cushioning cylinder passing through the lower plate, and having its upper end secured to the upper plate, and the piston in the lines of the cylinder, substantially as set forth.

7. The combination with the rising and falling time ball, having an exterior surface substantially continuous around the vertical axis, of a supplemental air-cushioning mechanism arranged within the ball consisting of a cylinder and a piston fitted therein, substantially as set forth.

8. The combination with the rising and falling time ball, and the base plate A', adapted to be secured stationarily, of the staff or guide having an extension projecting below the base plate and secured in place by devices supplemental to said plate, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM F. GARDNER.

Witnesses:

ALEX S. STEUART,
MARCUS B. MAY.