

(No Model.)

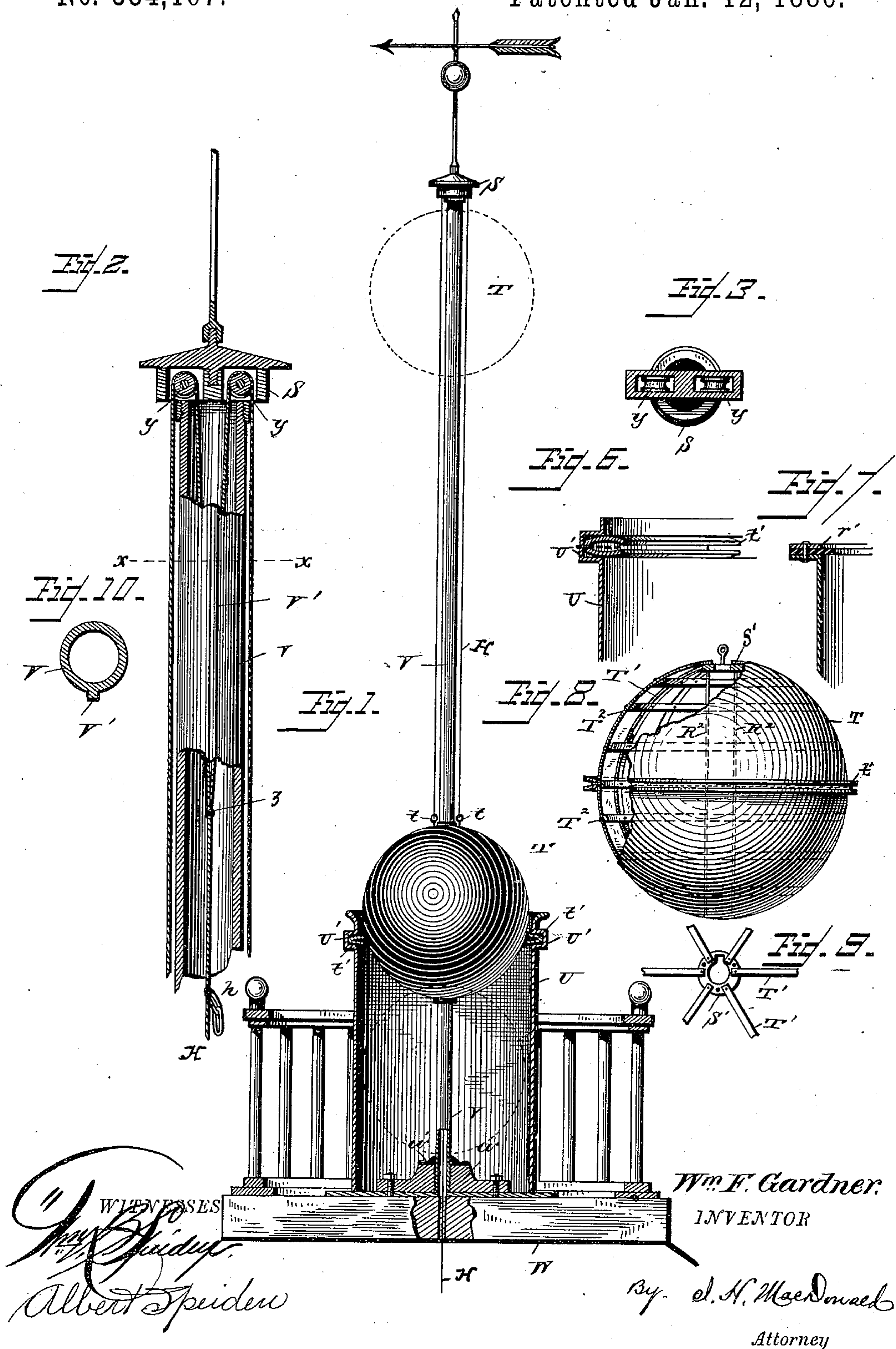
2 Sheets—Sheet 1.

W. F. GARDNER.

TIME BALL AND APPARATUS.

No. 334,167.

Patented Jan. 12, 1886.



(No Model.)

2 Sheets—Sheet 2.

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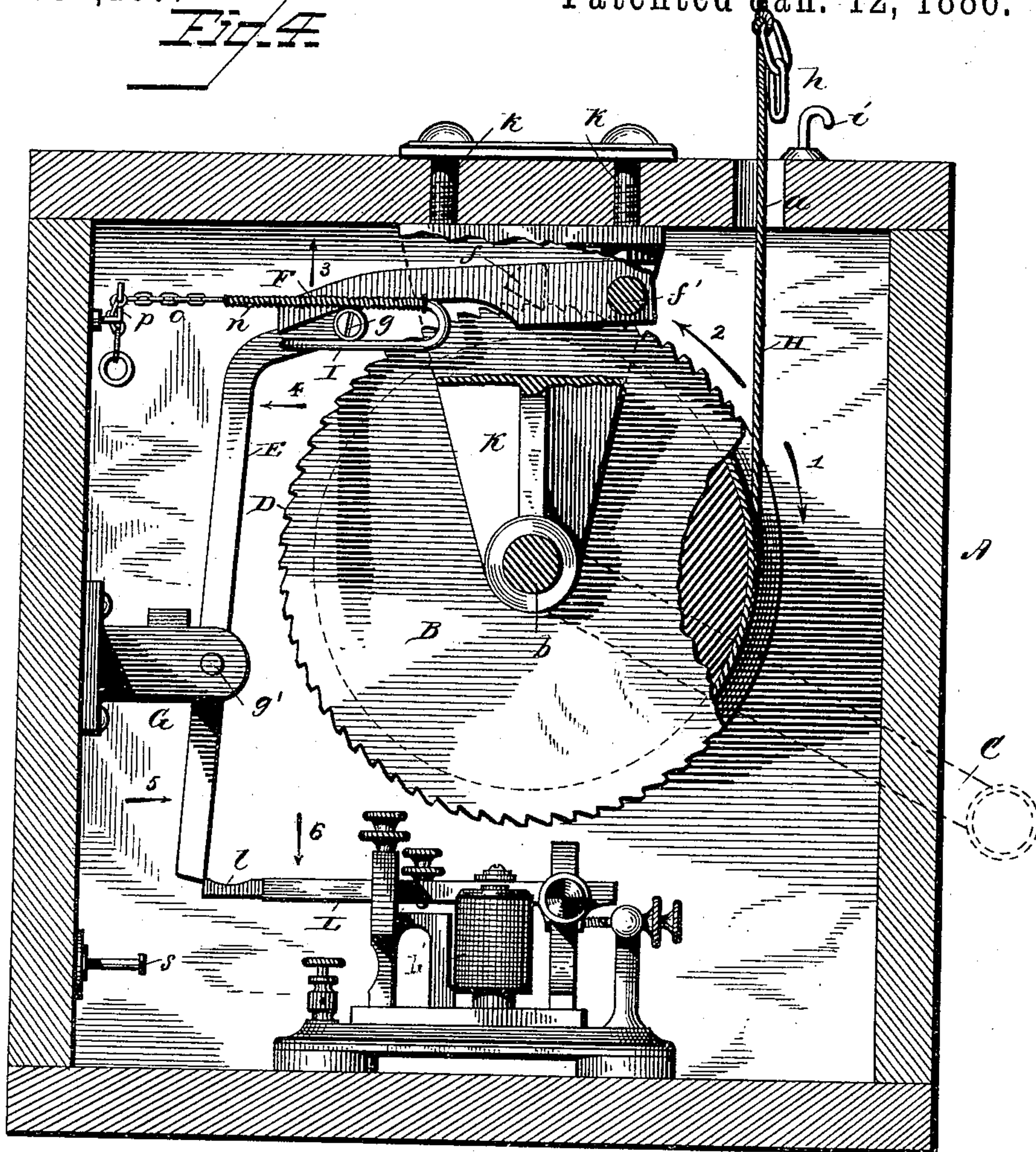
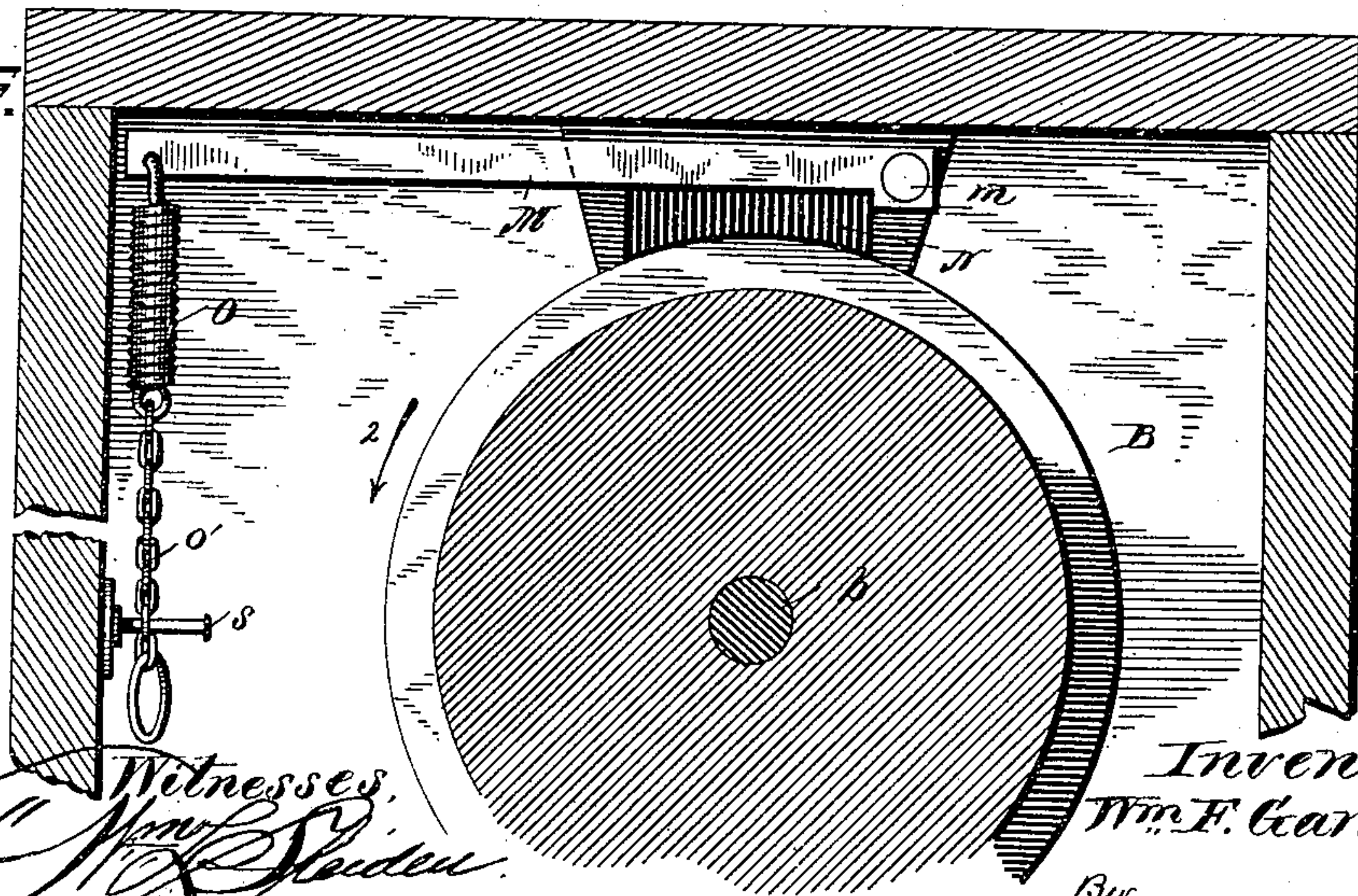


Fig. 5.



Witnesses:
 " *Nov. 21, 1892*
 Albert Spinden

Inventor
Wm. F. Gardner.
By,
J. H. McDonald
Atty.

UNITED STATES PATENT OFFICE.

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

TIME BALL AND APPARATUS.

SPECIFICATION forming part of Letters Patent No. 334,167, dated January 12, 1886.

Application filed April 30, 1885. Serial No. 163,910. (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 Controlling and Correcting Systems, of which the following is a specification, reference being had therein to the accompanying drawings.

10 My invention relates to time balls and signals; and it consists in certain details of construction and arrangement and operation of the several parts, as will be hereinafter more fully set forth in the specification, and pointed
15 out in the accompanying drawings, in which--

Figure 1 is an elevation, partly in section, of the ball-staff, ball, and cushion-chamber; Fig. 2, a vertical section of the staff and ball-hoisting device; Fig. 3, a detailed cross-section of
20 the cord-pulleys at the top of the ball-staff; Fig. 4, a vertical section of the locking and detaching apparatus; Fig. 5, a detail section of the winding-drum and friction-brake thereon; Figs. 6 and 7, sections of the cushion-
25 chamber, showing an elastic edge or strips to aid in cushioning the ball and protect it from wear; Fig. 8, an elevation of the ball partly in section; Fig. 9, a top view of the ball, showing the vertical ribs and one holding-plate;
30 Fig. 10, a cross-section of the staff on the line $x x$, Fig. 2.

Ordinarily time-balls have been composed of segments provided with closed cylinders fitting pistons or plungers on the platform-
35 base to take up the shock of the fall. In some instances the ball is permitted to fall upon spring-buffers, which take up the shock. Again, owing to the heavy balls used, the holding and releasing mechanism have been quite com-
40 plex, and do not always act promptly and efficiently, thereby causing an error in the time of the dropping of the ball. To remedy these defects I have constructed a light ball, a single air-chamber in which it cushions, and
45 a simple holding and detaching apparatus, as shown in the accompanying drawings.

Referring more particularly to the drawings, the ball T consists of a series of vertical light metal ribs, T^1 , joined at top and bottom to
50 plates S' , and a series of ribs, T^2 , arranged at right angles to the ribs T^1 and riveted thereto,

thereby forming a skeleton ball. In order to thoroughly brace the ribs and give stiffness to the ball, four vertical rods, R^2 , are passed through the skeleton frame and secured to the
55 top and bottom plates, S' . These plates are grooved on one side, as at s' , to receive the tongue V' on the staff. This tongue and groove prevent any lateral movement of the ball in its ascent or descent. Two swiveled eyebolts, 60
 t , are let into the top plate S' for attaching the ends of the cord H . In order to define the ball more clearly when raised, it is covered with canvas and the canvas covering
65 painted black. The ball drops into a single chamber, U , cushioning on the contained air. At the top of the chamber I place a double strip of felting, t' , or other elastic material, which is secured to the rim by a ring, r' ; or
70 the chamber may be creased or flanged, as at U' , for the insertion of this elastic guard or material, which extends into the chamber about an inch. This guard not only protects
75 the ball from wear or chafing on the chamber, but assists to cushion it, for as the ball reaches the chamber this guard is pressed down and acts as a gasket to prevent the rapid escape
80 of the contained air, thereby permitting the ball to settle gently into the chamber. I may also place a band of this double felting about the ball equidistant from the plate S' , as shown
85 in Fig. 8. The staff V , of any convenient length, is provided on one side with a tongue, V' , which acts as a guide in the plates S' of the ball, as before explained. At the top a
90 housing, S , covers the two pulleys, Y , and prevents moisture entering the staff. A cord or halyard passes over the two pulleys Y , and thence down into the staff, where the two parts are united together, as at z , the single piece
95 passing on down through the cushion-chamber U and base W to the winding-drum B . The staff is secured to a base-casting, w , which in turn is suitably secured to the base, as shown in
100 Fig. 1. At the top of the base-casting I have placed a rubber or elastic cushion, w' , to take up the impact of the falling ball. The detaching and holding mechanism is placed within a case or box, A , located beneath the roof of the building (or in a suitable apartment) and

drum, B, having a suitable winding-lever, C. The drum is mounted centrally on shaft *b*, supported by hangers K, attached to the top of the case. The drum has a groove at one end for the reception of a brake-shoe, N, on
 5 brake-lever M, which is pivoted at *m* to one of the cylinder-hangers K. The opposite end of the drum is provided with a ratchet, D. A pawl-lever, F, is pivoted to the hanger at
 10 *f'*, and is provided with a pawl, *f*, which engages with the ratchet D, to hold the drum when the halyard is wound up and the ball in position for dropping. At one side of the case a bracket, G, has pivoted thereto a lever,
 15 E, bent at its upper end, and at its extremity has a roller, *g*, journaled therein. This roller extends inwardly and engages with the under curved surface of the pawl-lever F. A U-shaped bar, I, has one of its arms passing
 20 into and secured to the lever E, the other arm having a coil-spring, which is secured by a chain, *o*, to a pin, *p*, in the casing. The lower end of lever E engages with the outer end of an armature, L, of the magnet L'. The brake-
 25 lever M has attached to its outer end a spring, O, for exerting a frictional tension, the spring being held down by means of a chain, O', engaging with the pin *s*, as shown in Fig. 5. A hook, *i*, on top of the case engages with the
 30 link *h*, to prevent the ball falling prematurely in case of accident to the local circuit.

The operation of the device is as follows: About five minutes before noon, after the exchange of preliminary signals, the lever E is
 35 locked against the end of armature L, thereby permitting the ball to be raised. This is accomplished by winding up the cord H on the drum (in the direction of arrow 1) until the ball has reached the top of the staff. This is
 40 evidenced to the person raising the ball by the link *h* arriving at the pin *s*. The pawl *f* on lever F now holds the drum, and therefore the ball, at the top of the staff; but in order to prevent the ball dropping prematurely (before the transmission of the final signal) by
 45 reasons of accidents to the local circuit, the link *h* is engaged with the hook *i*, so that no matter if at any time during the interval of sending the final signal the pawl should become disengaged from contact with the ratchet,
 50 the link *h* would prevent the cord becoming unwound, and thus prevent the ball dropping falsely. About a minute before the final dropping-signal this link is disengaged from the hook. When the final signal is sent, the magnet L' is energized and draws down its armature L in the direction of arrow 6. The lower
 55 end of lever E instantly moves in the direction of arrow 5, the upper end in the direction of arrow 4, and the pawl-lever F is carried up by the friction-roller *g* in the direction of arrow 3, and the pawl *f* thus disengaged from the ratchet. This disengagement of the lever E and its upward movement is

greatly accelerated by the spring *n* and arm *l*,
 65 which engages with this lever, as there is a constant tension of the spring and arm against said lever. The weight of the ball in falling tends to unwind the cord H, and the friction thus developed would cause the drum to re-
 70 volve rapidly and the cord to become overlapped and entangled. In order to prevent this, I have placed a brake, M, at the end of the drum opposite the ratchet, and provided with a brake-shoe, N, which exerts a constant fric-
 75 tion against the drum, for as the drum unwinds it turns in the direction of arrow 2, and therefore acts against the tension of the spring O, secured to the brake. While the ball is being wound up the chain O' is de-
 80 tached from contact with its holding pin, and consequently at this time the brake exerts no friction on the drum. Immediately the winding up is accomplished this chain is secured
 85 to its holding pin and the brake-shoe brought into frictional contact with the drum. When the ball has been dropped, and in its descent reaches the cylinder, it comes in contact with the elastic strips *t'* (which extend into the cyl-
 90 nder) and depresses them, thus forming a gasket which prevents the too rapid escape of the air in the chamber, and thus breaking the falling force of the ball and permitting it to quietly settle without undue shock or wear. It will thus be seen that there are but few
 95 parts in the holding and detaching apparatus, yet they are effective for the purpose.

Having thus described my invention, what I claim, as new and desire to secure by Letters Patent, is—

1. A time-ball consisting of a series of metallic ribs suitably covered and provided with a surrounding elastic strip or strips, substantially as set forth.

2. A ball for time and other signals, consisting of a series of vertical and horizontal ribs joined to each other, the vertical ribs being secured to grooved plates at the top and bottom of the ball, substantially as set forth.

3. In combination with a ball for time and other signals having plates perforated and grooved, as shown, a staff provided with a tongue or tongues, V', substantially as set forth.

4. The combination, with a time-ball, of a single air-chamber into which the ball is
 115 dropped, and in which it cushions on the contained air, substantially as set forth.

5. The combination, with a time-ball or other signals, of a single air-chamber provided with means for preventing the rapid escape
 120 of the confined air when the falling ball is received into said chamber, substantially as set forth.

6. The combination, with a time or signal ball, of an air-chamber provided with elastic
 125 or flexible strips extending into the body of the chamber, substantially as set forth.

7. An air-chamber for signal-balls, provided

with a base-plate, having an elastic cushion attached to the top of said base-plate; substantially as set forth.

5 8. A time-ball system having means for raising the ball and dropping it at a given moment, and provided with precautionary locking means for holding the ball and preventing it being dropped by a false signal.

10 9. In combination with a detaching device for time-balls, a locking-lever, F, provided with a lower curved surface, substantially as and for the purpose set forth.

15 10. In a locking and detaching device for time ball systems, a pivoted locking-lever, E, provided with a friction-roller to engage with the under curved surface of the pawl-lever, substantially as and for the purpose set forth.

20 11. In a locking and detaching device for time-ball systems, the combination, with the locking-lever and the pawl-lever, of an arm, l, and spring n, substantially as set forth.

12. In a locking and detaching device for time-ball systems, the combination, with the winding-drum, of a pivoted pawl-lever having a lower curved surface, a locking-lever having 25 a friction-roller engaging with the pawl-lever, a spring-arm, l, attached to the locking-lever, a friction-brake, and a magnet and its armature to hold the locking lever, substantially as set forth. 30

13. In a time-ball system, the combination of the ball, its supporting-cord, staff, a single air-chamber to receive said ball, the holding and detaching apparatus, and means for preventing the ball being dropped by false sig- 35 nals, substantially as set forth.

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

WM. F. GARDNER.

Witnesses:

EMMA M. GILLETT,
W. H. EDGAR.